A330
TECHNICAL TRAINING MANUAL
MECHANICAL & AVIONICS COURSE - T1+T2 (LVL 2&3)
(RR Trent 700)
R RECORDING

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R RECORDING

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G9409341 - GAUT0T0

RECORDING SYSTEM LINE MAINTENANCE BRIEFING (2)

RECORDING SYSTEM - OVERVIEW

Two independent recording functions are accomplished with the FDIMU. It combines the Flight Data Interface Unit (FDIU), which collects parameters for the DFDRS, and the Data Management Unit (DMU), which collects parameters for the ACMS.

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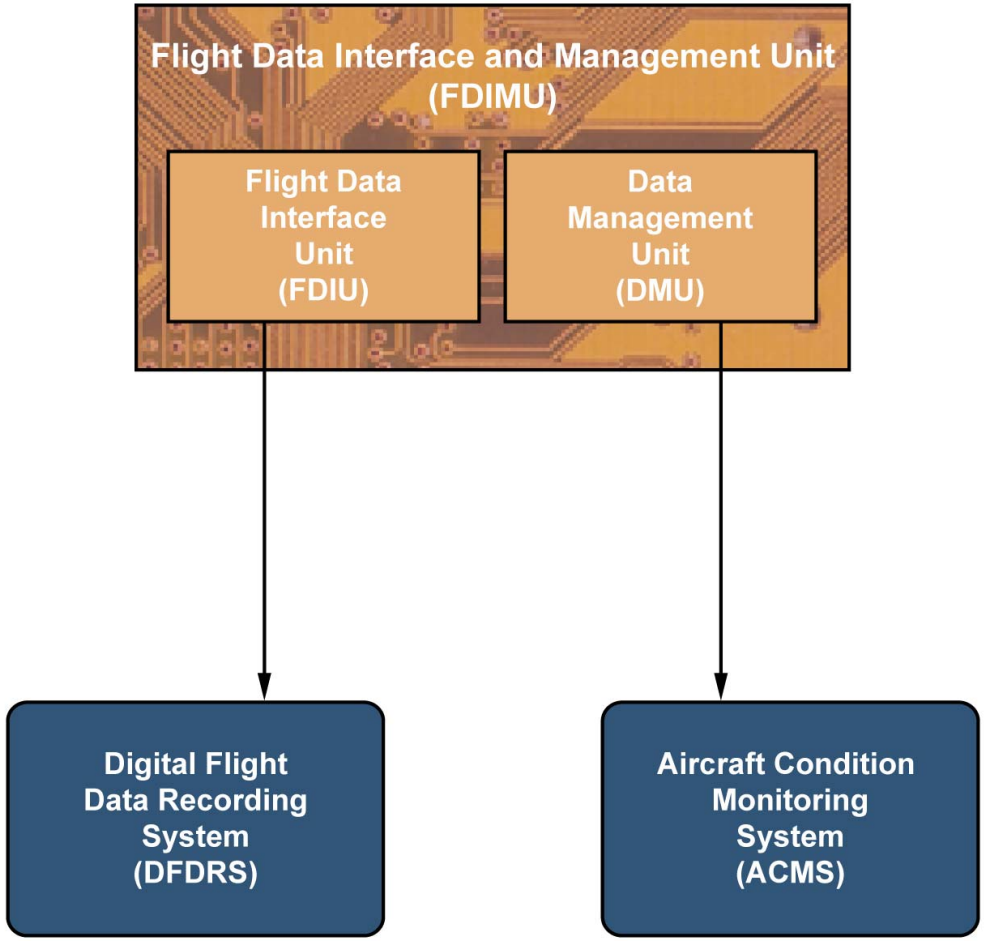

RECORDING SYSTEM - OVERVIEW

RECORDING SYSTEM LINE MAINTENANCE BRIEFING (2)

ACMS

PROCEDURE TO ENTER THE ACMS PARAMETER LABEL CALL-UP VIA MCDU

The access to the Aircraft Condition Monitoring System (ACMS) parameter Label Call-up functions is obtained only through MCDU 2 or 3 MENU page:
- from the ACMS PARAMETER CALL-UP menu select LABEL indication,
- from the LABEL CALL-UP CTRL page select LABEL MENU DISPLAY indication,
- enter the ARINC 429 characteristics of the desired parameter called parameter Label Call-up,
- the parameter Label Call-up is shown on the data field with the decimal and binary value of the related parameter,
- the Label Call-up parameters are now reviewed.

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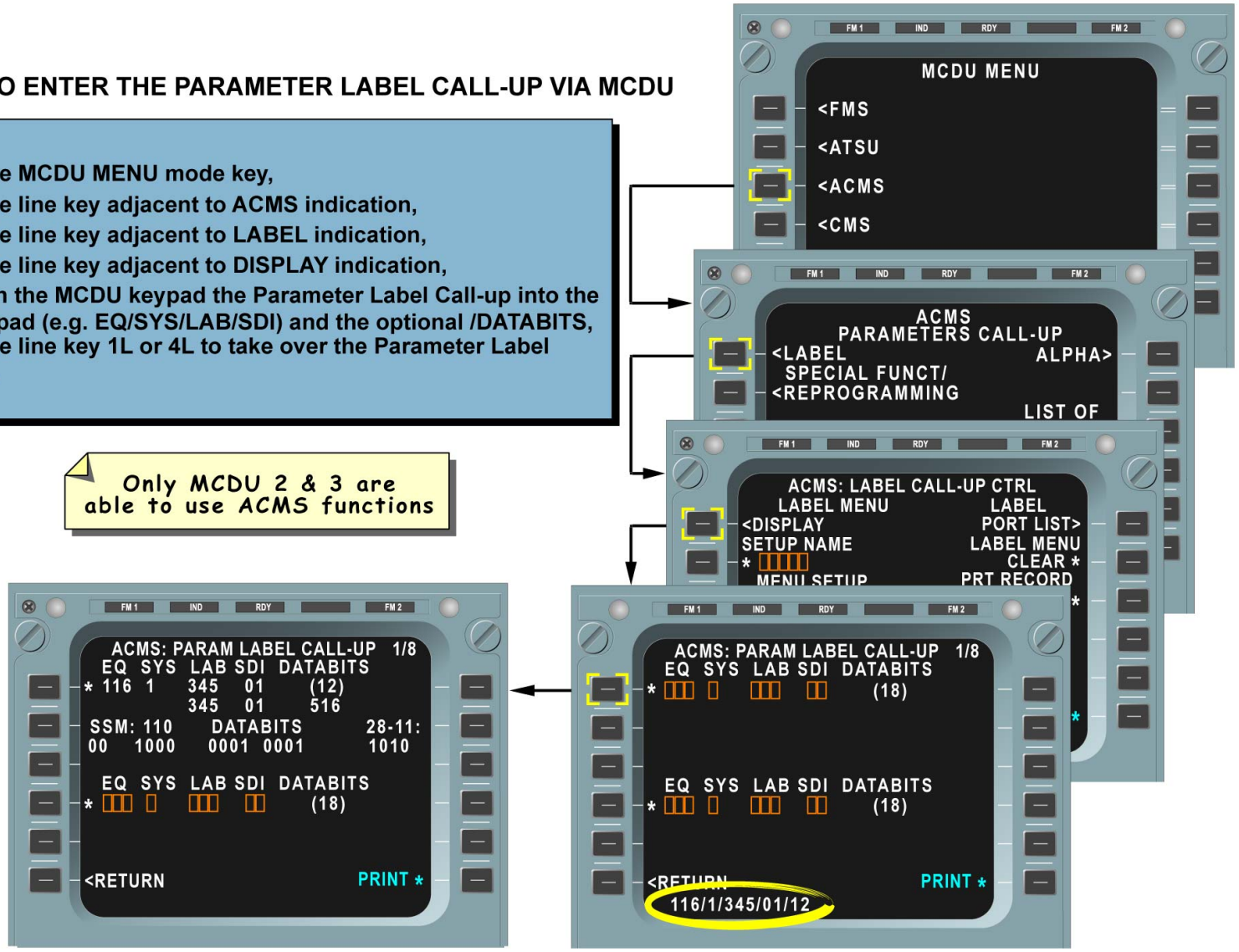
PROCEDURE TO ENTER THE PARAMETER LABEL CALL-UP VIA MCDU

- Push the MCDU MENU mode key,
- Push the line key adjacent to ACMS indication,
- Push the line key adjacent to LABEL indication,
- Push the line key adjacent to DISPLAY indication,
- Enter on the MCDU keypad the Parameter Label Call-up into the scratchpad (e.g. EQ/SYS/LAB/SDI) and the optional /DATABITS,
- Push the line key 1L or 4L to take over the Parameter Label Call-up.

Only MCDU 2 & 3 are able to use ACMS functions



ACMS - PROCEDURE TO ENTER THE ACMS PARAMETER LABEL CALL-UP VIA MCDU

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RECORDING SYSTEM LINE MAINTENANCE BRIEFING (2)

ACMS (continued)

PROCEDURE TO ENTER THE ACMS PARAMETER ALPHA CALL-UP VIA MCDU

The access to the ACMS parameter Alpha Call-up functions is obtained:
- from the ACMS PARAMETER CALL-UP menu select ALPHA indication,
- from the ALPHA CALL-UP CTRL page select ALPHA MENU DISPLAY indication,
- enter the Alpha numerical code of the desired Parameter called Alpha Call-up code,
- the parameter Alpha call-up code is shown on the data field with the related parameter in engineering units,
- the Alpha Call-up parameters are now reviewed.

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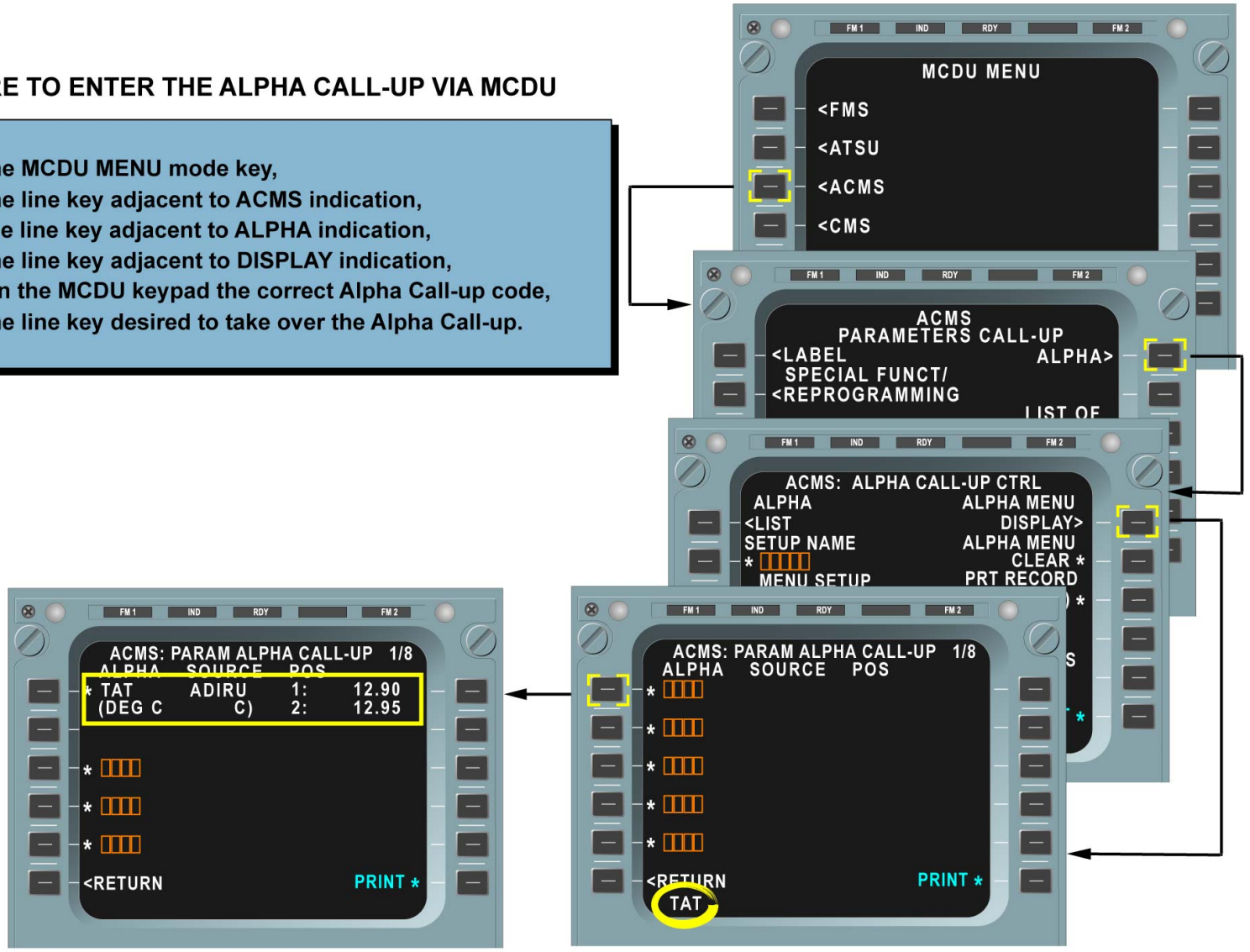
PROCEDURE TO ENTER THE ALPHA CALL-UP VIA MCDU

- Push the MCDU MENU mode key,
- Push the line key adjacent to ACMS indication,
- Push the line key adjacent to ALPHA indication,
- Push the line key adjacent to DISPLAY indication,
- Enter on the MCDU keypad the correct Alpha Call-up code,
- Push the line key desired to take over the Alpha Call-up.



ACMS - PROCEDURE TO ENTER THE ACMS PARAMETER ALPHA CALL-UP VIA MCDU

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RECORDING SYSTEM LINE MAINTENANCE BRIEFING (2)

ACMS (continued)

MAINTENANCE TIPS

The Alpha numerical code of the desired parameter called Alpha Call-up code can be retrieved from a parameter list displayed in the AMM within the ACMS description and operation part.
The ARINC 429 characteristics of the desired parameter called Parameter Label Call-up can be retrieved from a parameter list displayed in the AMM, within the interface description of each system.
The parameter Label Call-up can also be shown in the Trouble Shooting Manual (TSM) if it is necessary to be used to troubleshoot a system. The Parameter Label Call-up is made up of:
- the EQuipment number,
- the SYStem number,
- the LABel parameter,
- the Source/Destination Identifier (SDI),
- the number of data bits (DATABITS).

It is important to enter the DATABITS value if it is different from the default value (18). The decimal value calculation is based on it.

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ALPHA CALL-UP LIST (EXTRACT OF AMM 31-36-00)

ALPHA CALL-UP	PARAMETER NUMBER (p)	PARAMETER NUMBER (s)	NAME	UNIT
ACID	15A.1.301.00	-	Aircraft Identification	
	15A.1.302.00	-		
	15A.1.303.00	-		
ACM1	07A.1.353.01	-	APU Maintenance Word 1	HEX
ACTP	15A.1.304.00	-	Aircraft Type	
ACW1	00D.1.070.00	-	APU Control Word 1	HEX
ACW2	00D.1.071.00	-	APU Control Word 2	HEX
ACW3	00D.1.072.00	-	APU Control Word 3	HEX
ACYC		-	APU Start Cycles	CYCLES
AFD1	07A.1.133.01	-	Averange Fuel Density	
			- Left Inner Tank	KGS/L
AFD2	00D.1.122.10	-	- Right Inner Tank	KGS/L
AFT1	00D.1.121.01	-	Averange Fuel Temperature	
			- Left Wing Collectors	DEG C
AFT2	00D.1.121.10	-	- Right Wing Collectors	DEG C
AHRS	07A.1.132.01	-	APU Operating Hours	HRS
AILL1	06C.1.310.01	06D.2.310.10	Aileron Position - Left Inner	DEGS
AILL2	06C.1.320.01	06D.2.320.10	Aileron Position - Left Inner	DEGS
AILR1	06C.1.330.01	06D.2.330.10	Aileron Position - Left Inner	DEGS
AILR2	06C.1.340.01	06D.2.340.10	Aileron Position - Left Inner	DEGS
ALID	15A.1.303.00	-	Airline Identification	
ALT	006.1.203.01	06D.2.203.10	Pressure Altitude	FT
ALTR	001.1.365.00	01D.2.365.00	Pressure Altitude Rate	FT/MIN

Depending on the aircraft type and effectivity, the Alpha call-up list can be different.

ACMS - MAINTENANCE TIPS

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ARINC PARAMETER LIST (EXTRACT OF AMM 31-36-00)

EQ	SYSTEM	CHAPTER
05C	CPC 1 & 2	21-31-00
05D	ZC	21-63-00
039	MCDU 2 & 3	22-86-00
15B	FCU (AFS M1 BUS)	22-86-00
F15	FCU (EIS CPL-BUS)	22-86-00
E15	FCU (EIS CPR-BUS)	22-86-00
002	FMGEC 1 & 2 (FMC-BUS)	22-86-00
001	FMGEC 1 & 2 (FGC-BUS)	22-86-00
00A	FMGEC 1 & 2 (E GEN-BUS)	22-86-00
06C	FCDC 1 & 2	27-93-00
		27-94-00
		27-95-00
01B	SFCC 1 & 2	27-51-00
114	FCMC 1 & 2	28-51-00
F16	DMC (EFIS-BUS)	31-62-00
16B	DMC (ECAM-BUS)	31-62-00
026	FWC 1 & 2 (L1-BUS)	31-52-00
F26	FWC 1 & 2 (L2-BUS)	31-52-00
029	SDAC 1 & 2 (L1-BUS)	31-54-00
F29	SDAC 1 & 2 (L2-BUS)	31-54-00
06D	LGCIU 1 & 2	32-61-00
06E	BSCU 1 & 2	32-42-00
023	GPWS	34-48-00
06F	BMC 1 & 2 & 3 & 4	36-11-00
11A	MDDU	45-23-00
07A	ECB	49-61-00
116	EIVMU 1 & 2 & 3 & 4	73-25-00

Depending on the aircraft type and effectivity, the parameter list can be different.
Then, each set of parameters is in the applicable chapter.

ACMS - MAINTENANCE TIPS

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G9409341 - GAUT0T0 - FM31B200000001

DFDRS GENERAL DESCRIPTION (3)

GENERAL

The Digital Flight Data Recording System (DFDRS) records flight parameters, from A/C systems, into the Digital Flight Data Recorder (DFDR) to fulfill the mandatory requirements of crash recording.

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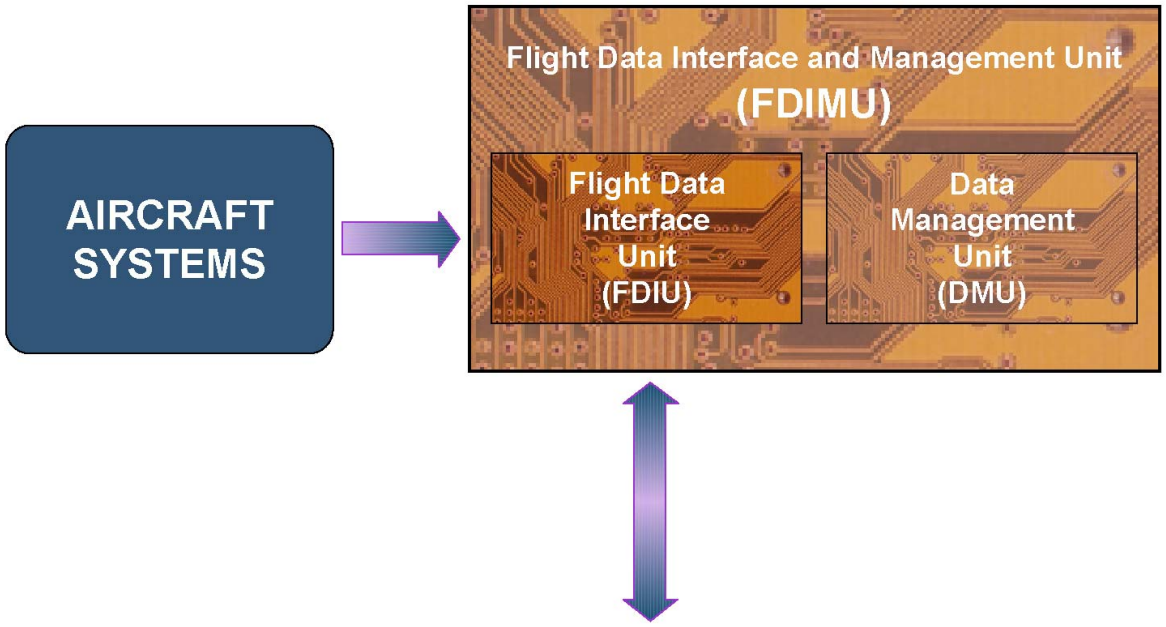

Digital Flight Data Recorder (DFDR)

GENERAL

DFDRS GENERAL DESCRIPTION (3)

ARCHITECTURE

The DFDRS includes the Flight Data Interface Unit (FDIU) part of the Flight Data Interface Management Unit (FDIMU), a DFDR, a Linear Accelerometer (LA), an EVENT P/B and a Recorder Ground Control P/BSW to meet the minimum requirements. A Quick Access Recorder (QAR) can be optionally installed.

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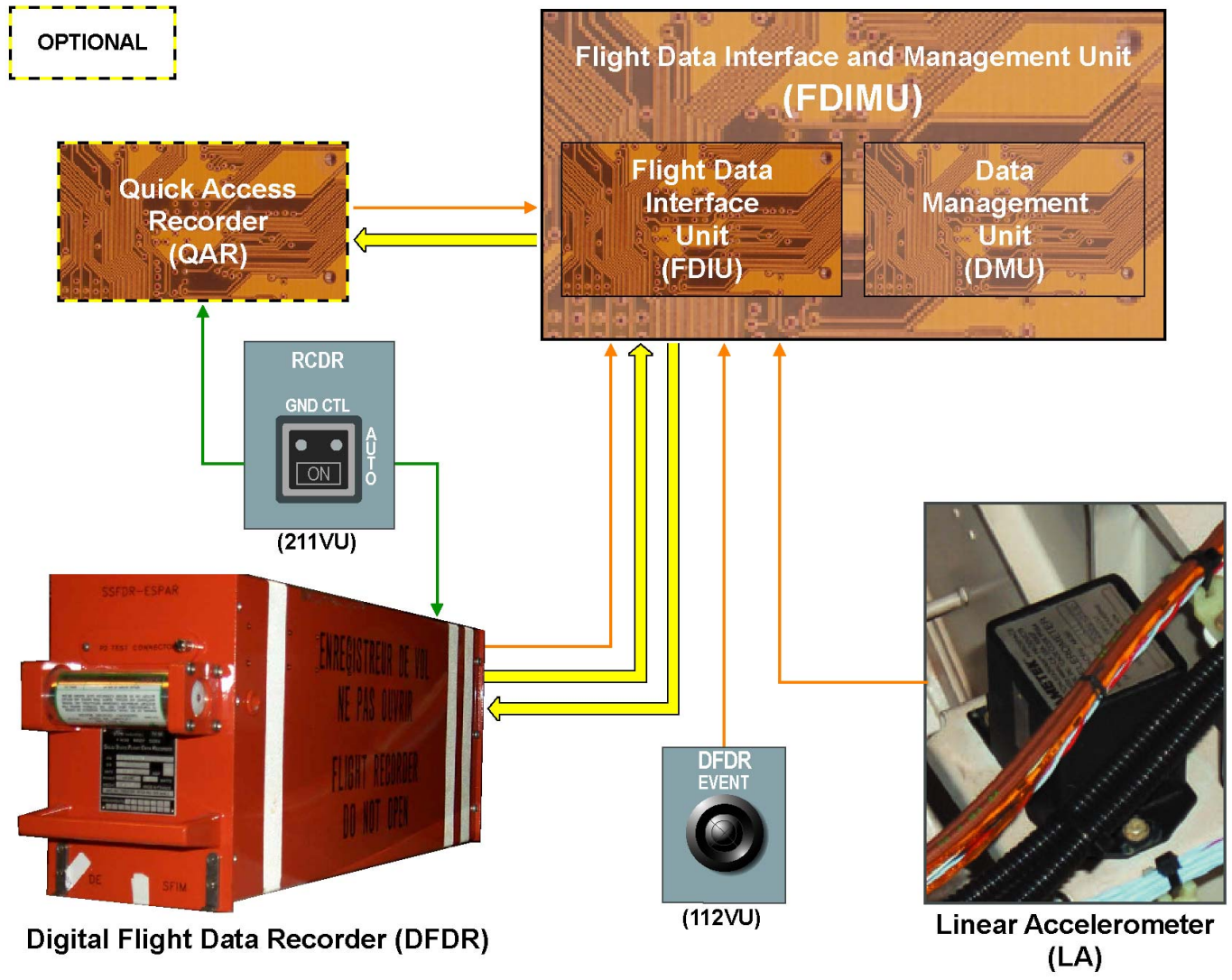

ARCHITECTURE

G9409341 - GAUT0T0 - FM31DF000000001

DFDRS GENERAL DESCRIPTION (3)

FDIU

The FDIU part of the FDIMU, located in the avionics bay, is a computer which collects various basic aircraft system parameters and converts them by internal processing. The aircraft system parameters are transmitted to the DFDR for recording. A time reference signal is sent to the Cockpit Voice Recorder (CVR) for synchronization with the DFDR.
The Pin Programming Connector (PPC), located in the avionics bay, gives to the FDIU identification information such as:
- aircraft tail number,
- airline identification,
- fleet identification,

The aircraft type, DFDR record version and QAR speed are given to the FDIU directly by pin programming.

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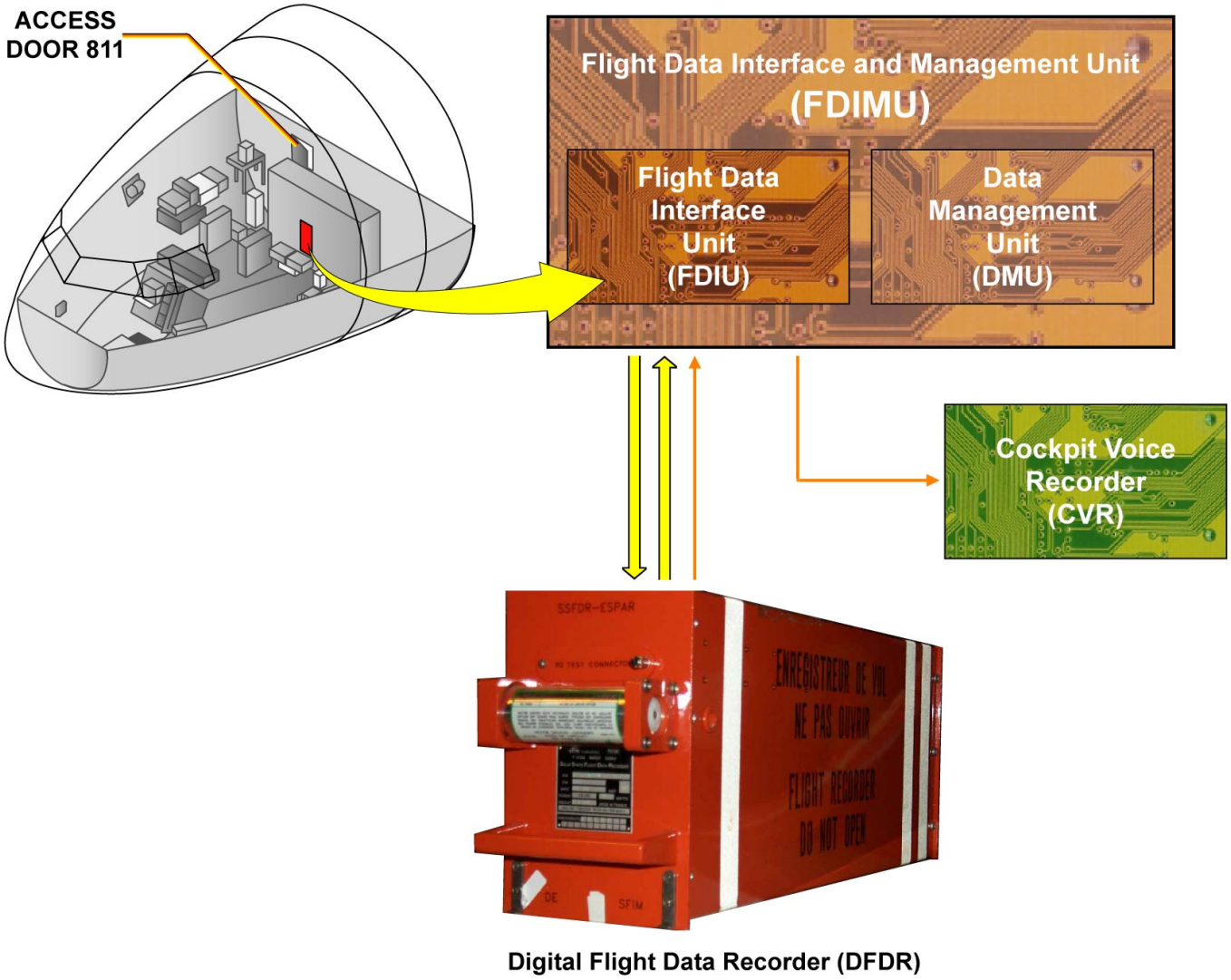
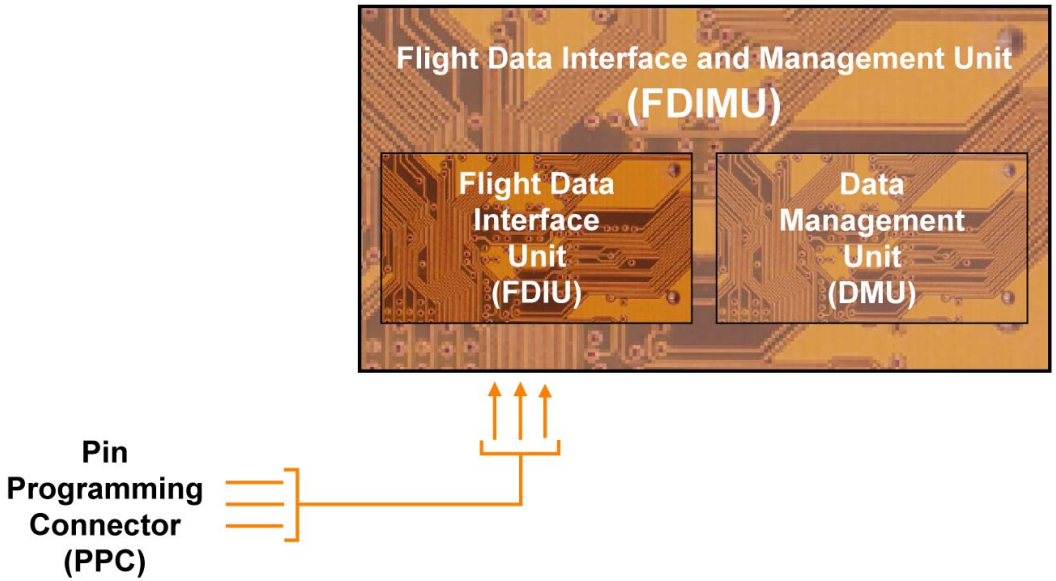

ACCESS
DOOR 811
Flight Data Interface and Management Unit
(FDIMU)
Flight Data Interface Unit (FDIU)
Data Management Unit (DMU)
Cockpit Voice Recorder (CVR)
SSFDR-ESPAR
ENREGISTREUR DE VOL
NE PAS OUVRIR
FLIGHT RECORDER
DO NOT OPEN
Digital Flight Data Recorder (DFDR)

FDIU


Flight Data Interface and Management Unit
(FDIMU)
Flight Data Interface Unit (FDIU)
Data Management Unit (DMU)
Pin Programming Connector (PPC)
Informations transmitted through analog signals :
- A/C tail number,
- Airline indentification,
- Fleet identification.

FDIU

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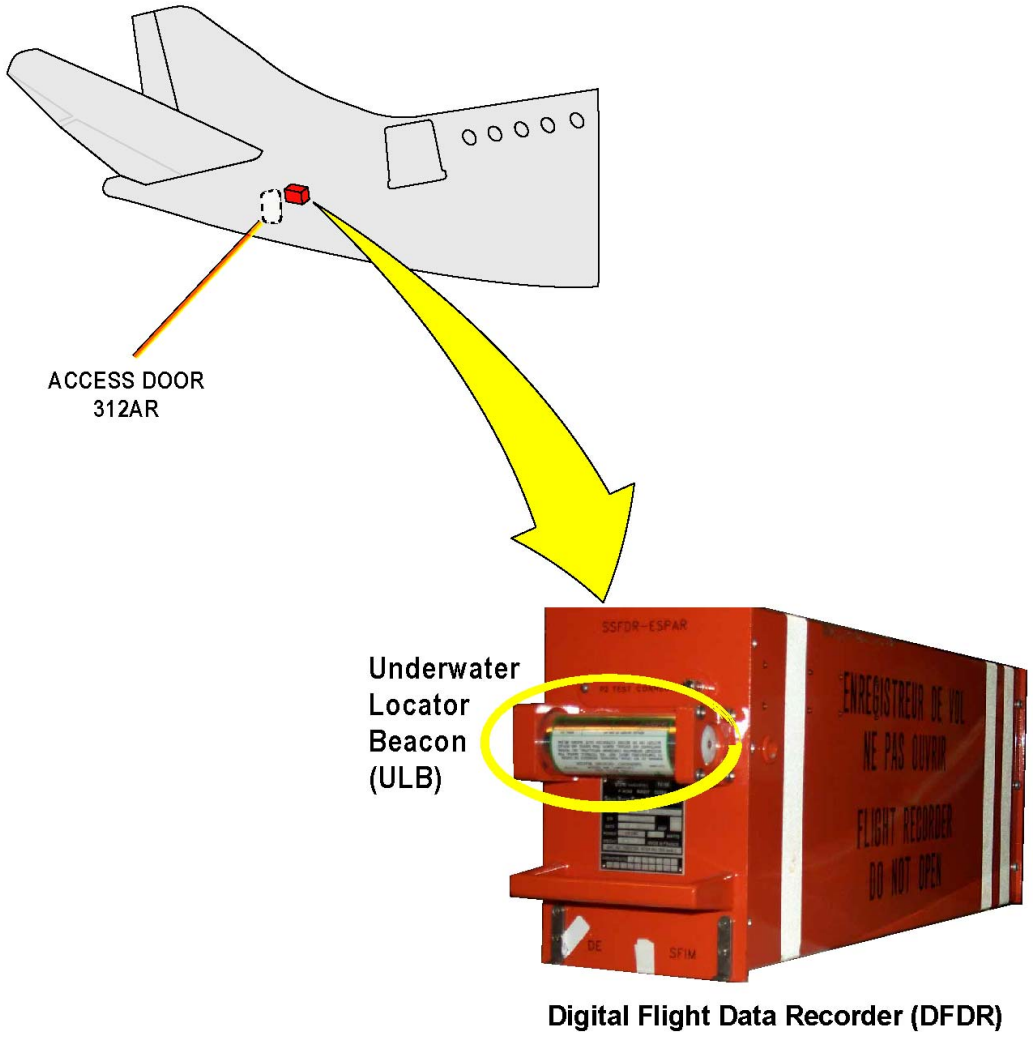
G9409341 - GAUT0T0 - FM31DF000000001

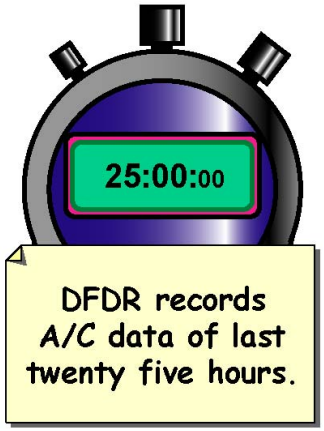
DFDRS GENERAL DESCRIPTION (3)

DFDR

The DFDR is a recorder located in the aft part of the aircraft, which stores, in a solid state memory, the data of the last twenty-five hours collected by the FDIU. The memory board is located in a protected box. The front face of the DFDR includes an Underwater Locator Beacon (ULB).

G9409341 - GAUT0T0 - FM31DF000000001





Digital Flight Data Recorder (DFDR)

DFDR

DFDRS GENERAL DESCRIPTION (3)

LINEAR ACCELEROMETER

A Linear Accelerometer (LA) is installed in the aircraft center of gravity to give to the FDIU the data of three axis of acceleration. The FDIU receives the LA information via the System Data Acquisition Concentrators (SDACs).

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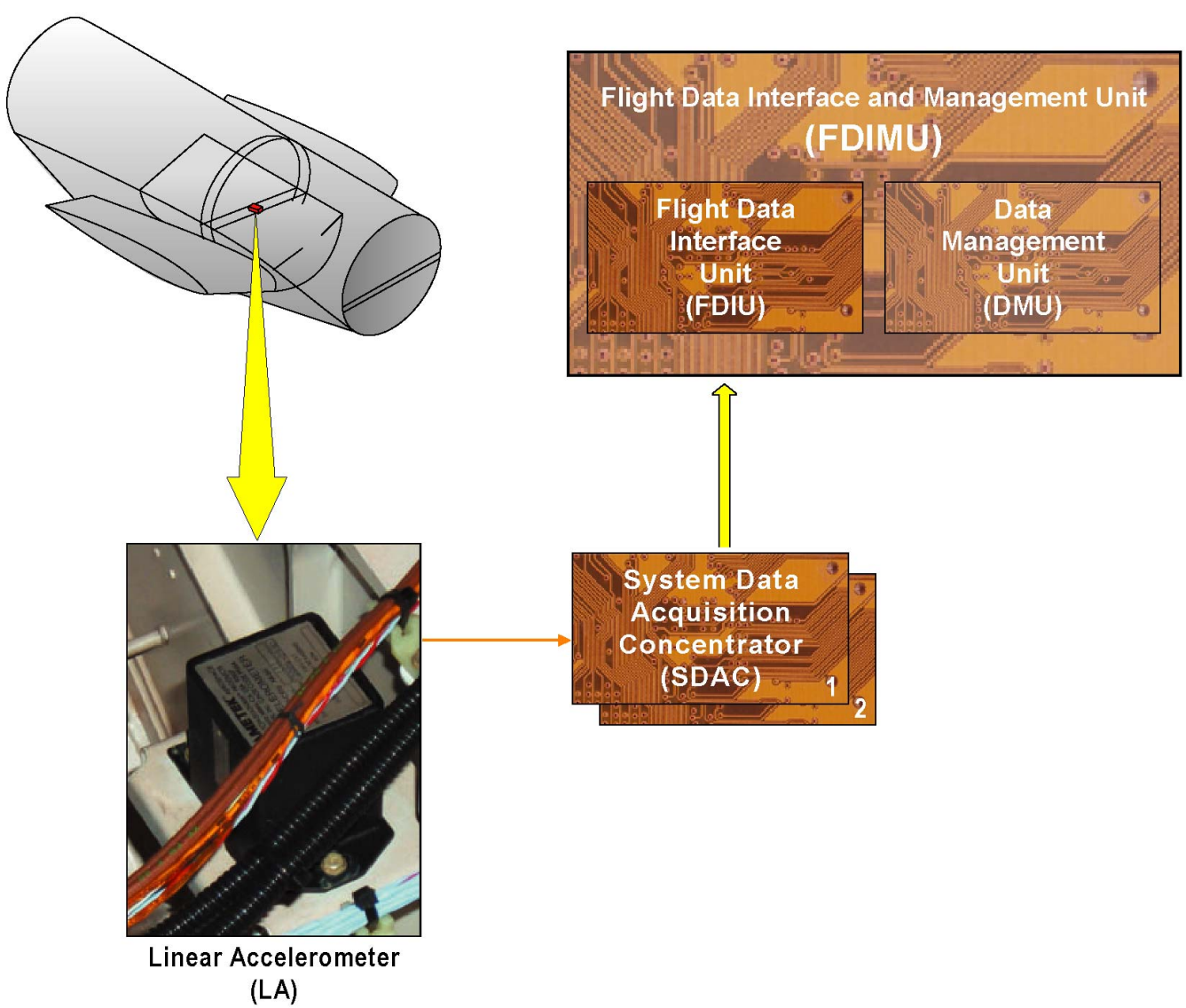


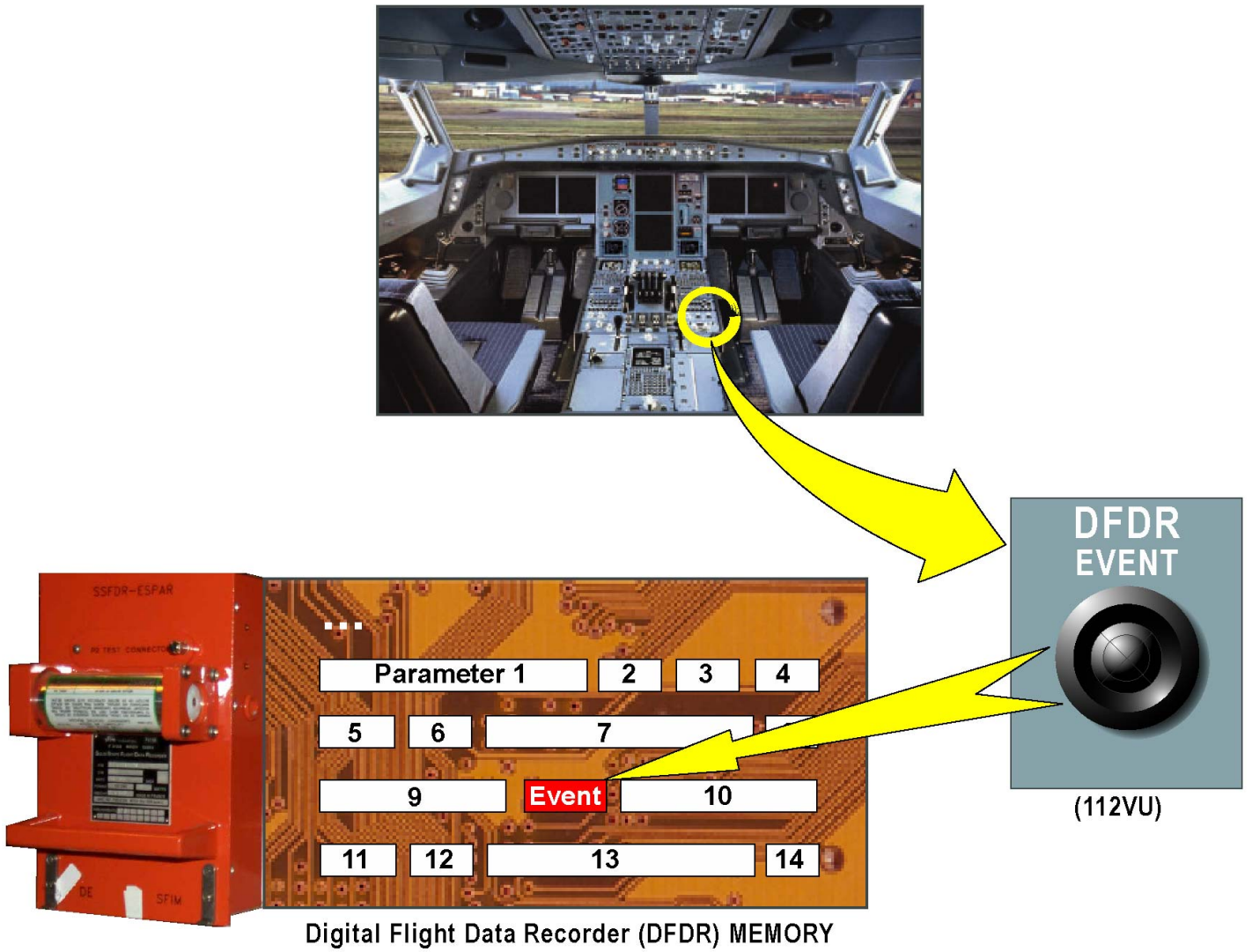
LINEAR ACCELEROMETER

DFDRS GENERAL DESCRIPTION (3)

DFDR EVENT

An EVENT P/B is located on the cockpit center pedestal. When pushed, the EVENT P/B is used to record an event mark in the DFDR memory. This enables the technician to quickly find the event out of the 25 hours of data.

G9409341 - GAUT0T0 - FM31DF000000001


DFDR
EVENT
(112VU)
SSFDR-ESFAR
Parameter 1
2
3
4
5
6
7
9
Event
10
11
12
13
14
Digital Flight Data Recorder (DFDR) MEMORY

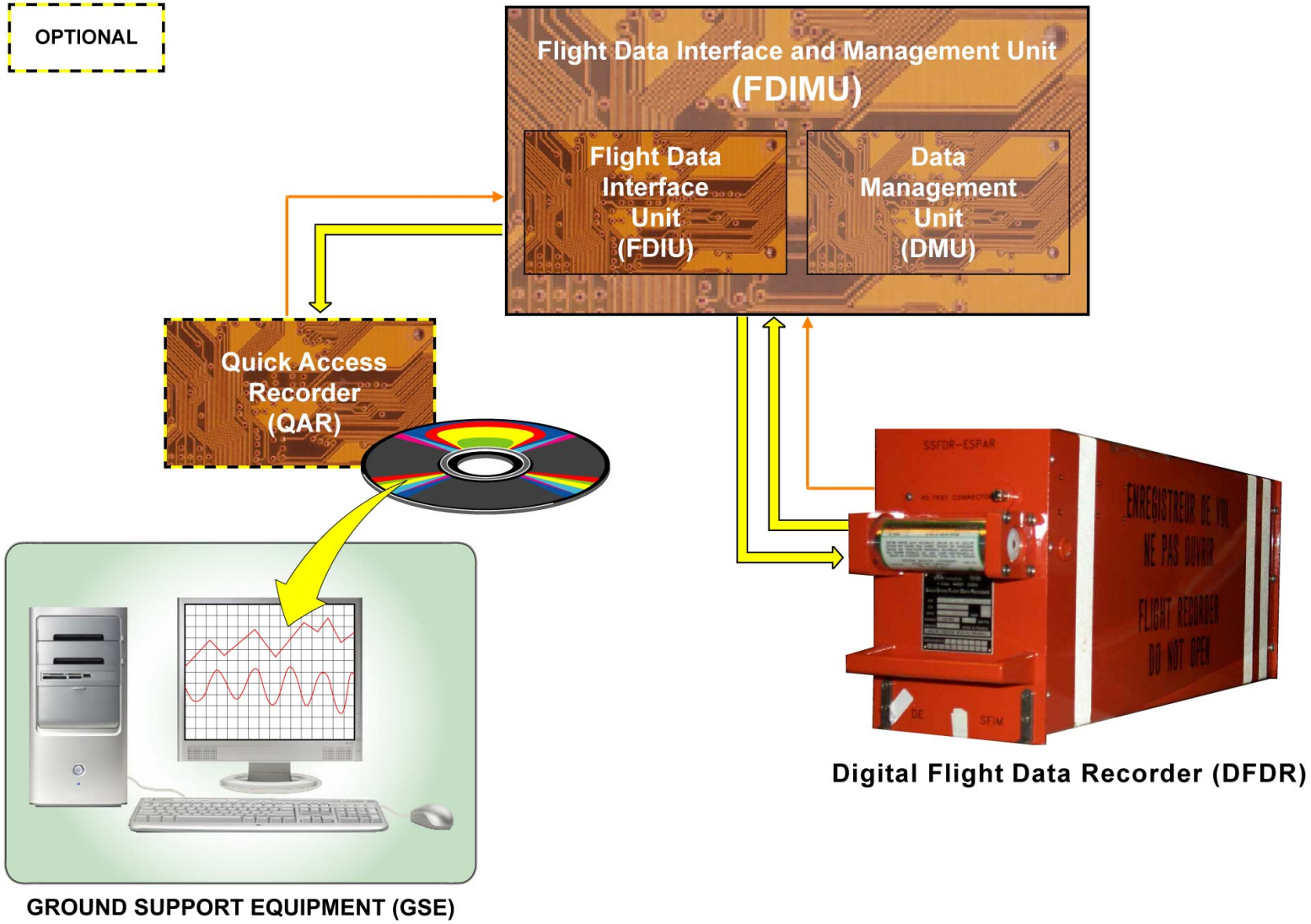
DFDR EVENT

DFDRS GENERAL DESCRIPTION (3)

QAR (OPTION)

The DFDR parameters can be optionally recorded on an optical disk located in the Quick Access Recorder (QAR). This lets the performance or condition monitoring tasks be carried out through the Ground Support Equipment (GSE). The QAR is installed in the avionics compartment.

G9409341 - GAUT0T0 - FM31DF000000001


OPTIONAL
Flight Data Interface and Management Unit
(FDIMU)
Flight Data Interface Unit (FDIU)
Data Management Unit (DMU)
Quick Access Recorder (QAR)
SSFDR-ESPAR
ENREGISTREUR DE VOL
NE PAS OUVRIR
FLIGHT RECORDER
DO NOT OPEN
Digital Flight Data Recorder (DFDR)
GROUND SUPPORT EQUIPMENT (GSE)

QAR (OPTION)

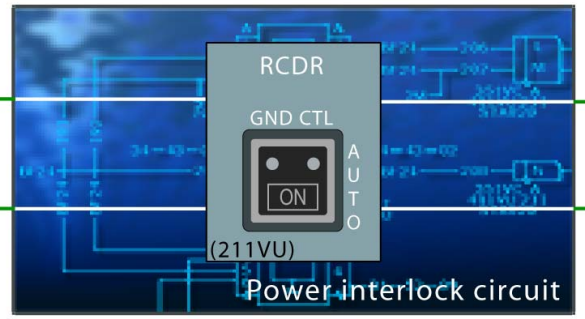
DFDRS GENERAL DESCRIPTION (3)

POWER SUPPLY

The DFDR and QAR power up is controlled through a power interlock circuit. On ground, for test and maintenance purposes, as well as for preflight check, it is possible to supply power to the DFDR and QAR by pressing the RCDR GND CTL P/BSW on the overhead panel.

G9409341 - GAUT0T0 - FM31DF000000001

OPTIONAL



POWER SUPPLY

Quick Access Recorder (QAR)

Digital Flight Data Recorder (DFDR)

Recorders are powered automatically:

- ✓ At AIC power up during 5mn,
- ✓ If 1 engine is started,
- ✓ Until 5 minutes after last engine shutdown,
- ✓ If RCDR GND CTL P/B is pushed on ground.

POWER SUPPLY

DFDRS D/O (3)

FDIMU

The Flight Data Interface Management Unit (FDIMU) controls the recorder system. The FDIMU integrates the former Flight Data Interface Unit (FDIU)(DFDRS function) and Data Management Unit (DMU)(ACMS function) with PCMCIA interface into a single Line Replaceable Unit (LRU). These two functions operate independently from each other. The FDIU section is dedicated to the Digital Flight Data Recording System (DFDRS) acquiring mandatory parameters to record for incident/accident investigations by the airworthy authorities. The DMU section is dedicated to the Aircraft Condition Monitoring System (ACMS) monitoring aircraft systems condition, mainly engines and APU systems, as well as aircraft performance. These monitoring is used to schedule maintenance tasks and operation recommendations, and for trouble shooting assistance In addition, for the PCMCIA recording functions, data transmission from the FDIU part to the DMU part is given through an internal ARINC 429 data bus.

FDIU

The FDIU section is the heart of the DFDRS. The main functions of the FDIU are to collect all critical flight parameters from various aircraft systems and to send them to the Digital Flight Data Recorder (DFDR) via an ARINC 717 data bus. At the same time the FDIU sends an audio signal with encoded Greenwich Mean Time (GMT) information to the Cockpit Voice Recorder (CVR) for synchronization with the DFDR.
The Linear Accelerometer (LA) is installed on the aircraft center of gravity, and supplies 3 axes acceleration data in analog format to the System Data Acquisition Concentrator (SDAC), which transmits information to the FDIU via an ARINC 429 data bus. The PCMCIA interface and the Multipurpose Disk Drive Unit (MDDU) let the FDIU upload the application software. The PCMCIA card stores DFDRS control flight parameters independently from the recording done in the Quick Access Recorder (QAR). The PCMCIA board is managed by the DMU processor, and is accessible through an access door on the FDIMU front face.
When the FDIU receives an analog signal from the DFDR EVENT P/B, it generates an event mark in the DFDR memory.
The Pin Programming Connector (PPC) gives to the FDIU, analog signals of aircraft tail number, airline indent and fleet indent. The aircraft type, DFDR record version and QAR recording speed are given to the FDIU directly by pin programming.
The FDIU is installed with a BITE function that reports DFDRS status to the Central Maintenance System (CMS).

QAR FUNCTION

The optional QAR records the raw data, sent by the FDIU part to the DFDR, on an optical disk. The DFDR and QAR recording are simultaneously controlled through the power interlock circuit. On the ground, it is possible to supply power to DFDR and QAR by pressing the RCDR GND CTL pushbutton. A specific QAR Analysis Ground Station (AGS) reads the QAR memory allowing aircraft performance and condition monitoring tasks. A Pin Programming sets the QAR recording speed. The QAR includes a BITE function, which reports its status to the FDIU.

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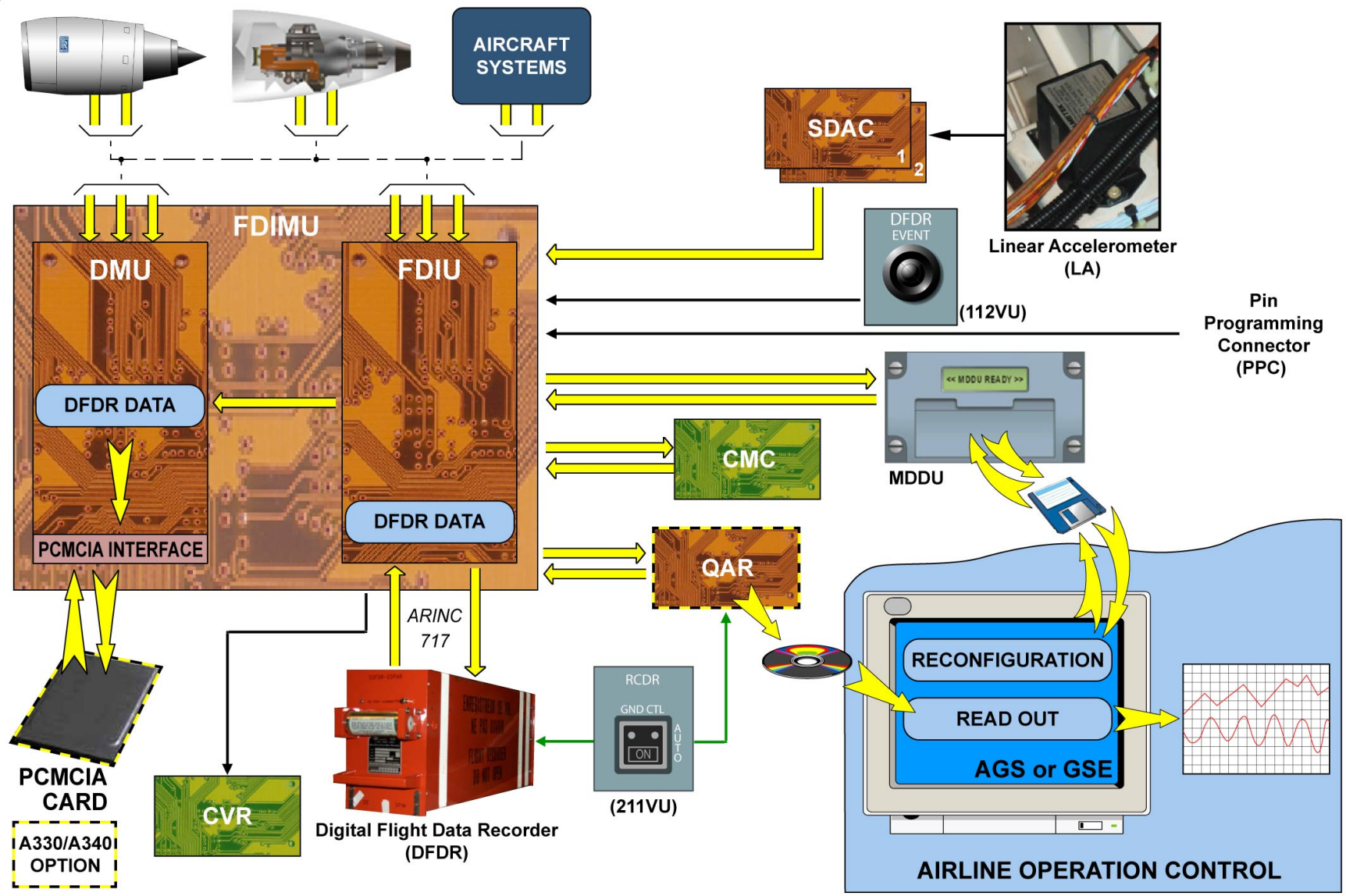


FDIMU ... QAR FUNCTION

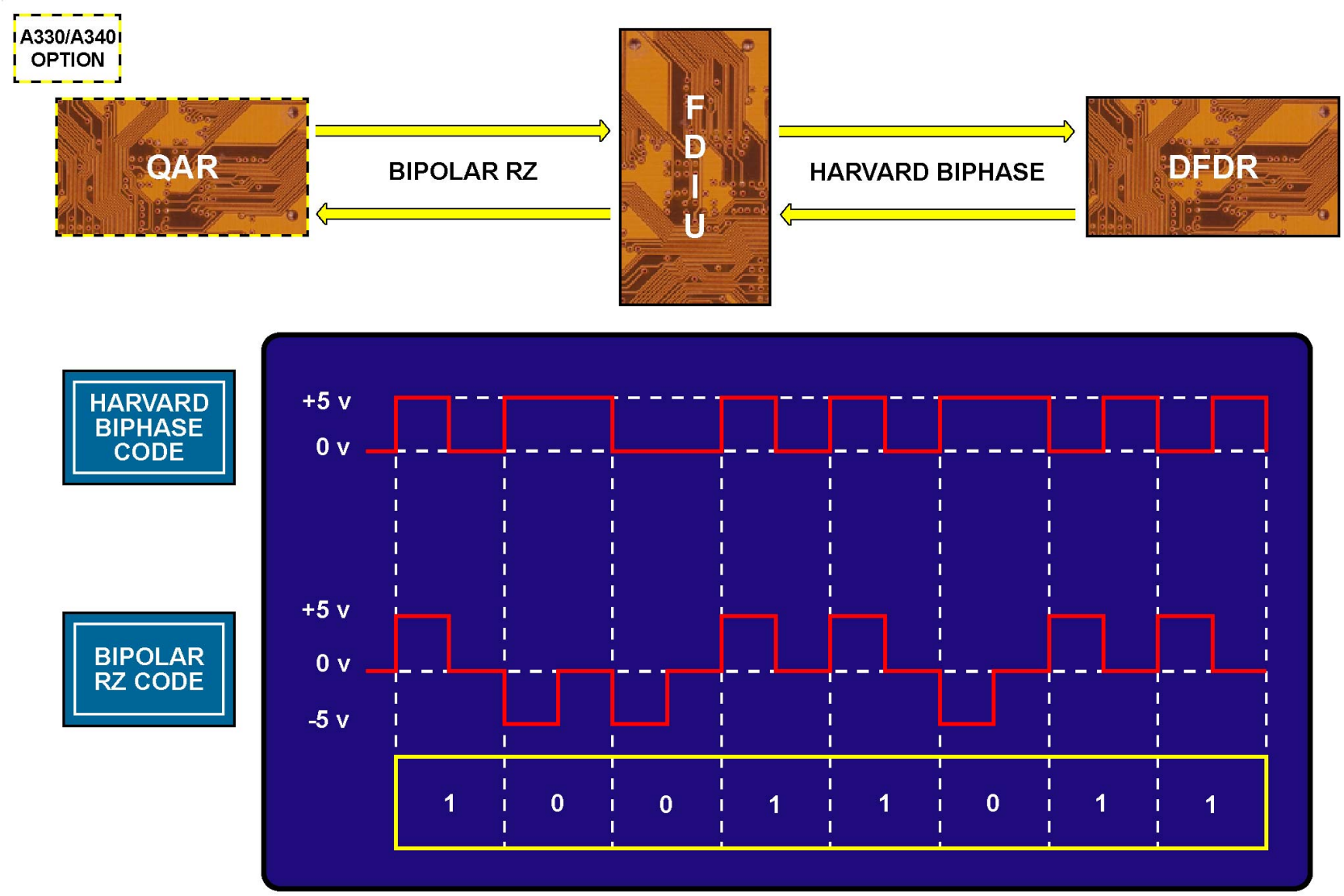
G9409341 - GAUT0T0 - FM31D4F31D30402

DFDRS D/O (3)

CODE COMPARISON

The transfer of data from the FDIU to the DFDR and QAR (if installed) is done via digital data links with specific format. The data link format between the FDIU and the DFDR is called Harvard Biphase. The data link format between the FDIU and the QAR is called Bipolar RZ (Return to Zero). Here is an example of the same binary word by the two codes. Note that the ARINC 429 transmission is also Bipolar RZ.

G9409341 - GAUT0T0 - FM31D4F31D30402



CODE COMPARISON

DFDRS D/O (3)

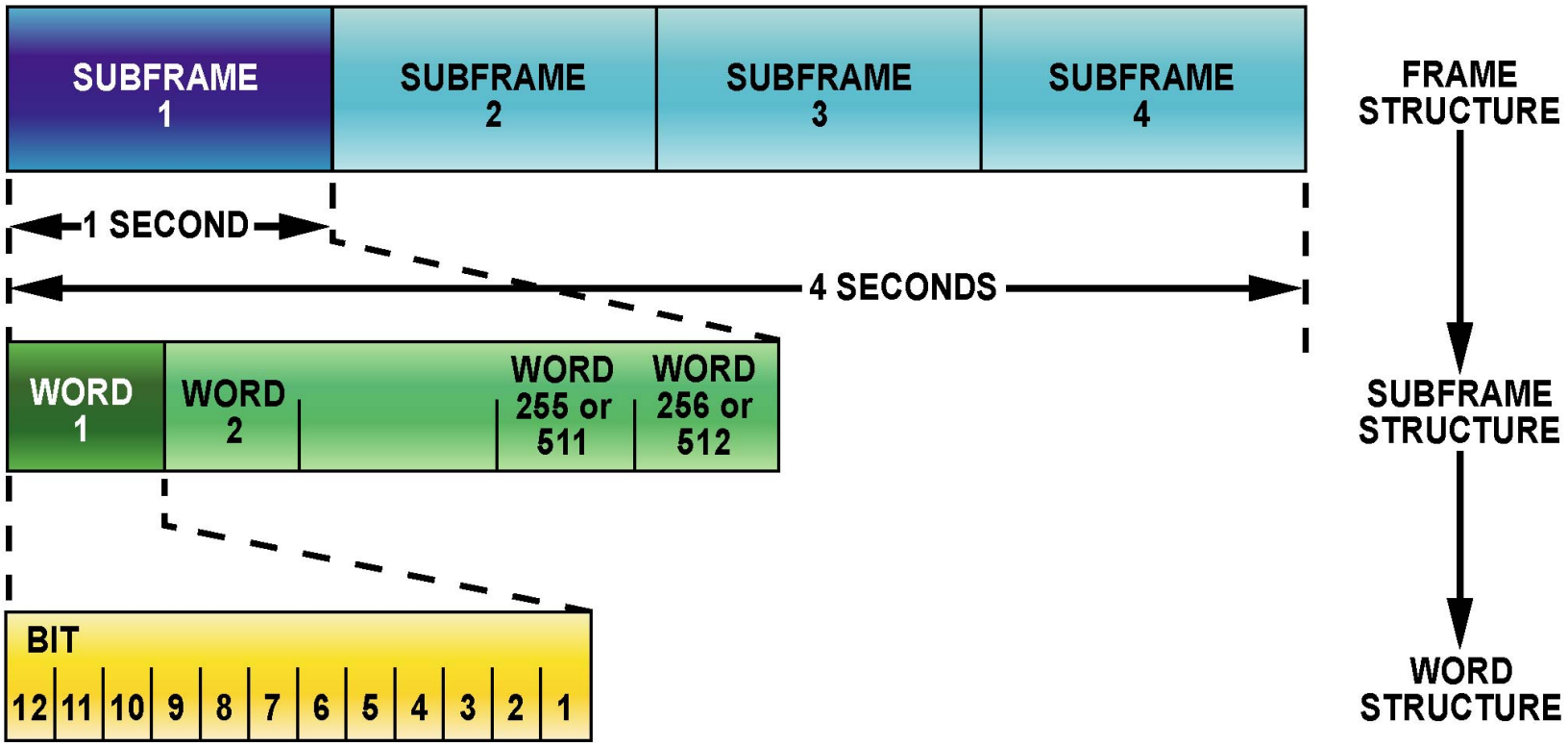
FRAME DESCRIPTION

The data is sent to the recorders on frames, which are composed of 4 subframes. A frame lasts 4 seconds and is repeated every 4 seconds. Depending on the authority requirements, the subframe will contain 256 or 512 words of 12 bits.

WORD ASSIGNMENT

The collected parameters are transmitted from the FDIU to the recorders and stored in defined word slots. Most of the parameters are repeated every second, some every 2 seconds or every 4 seconds. One word can contain one or more parameters.
It should be noted that acceleration data is more often transmitted (every second) and documentary data is less often transmitted (every 4 seconds).

G9409341 - GAUT0T0 - FM31D4F31D30402



FRAME DESCRIPTION & WORD ASSIGNMENT

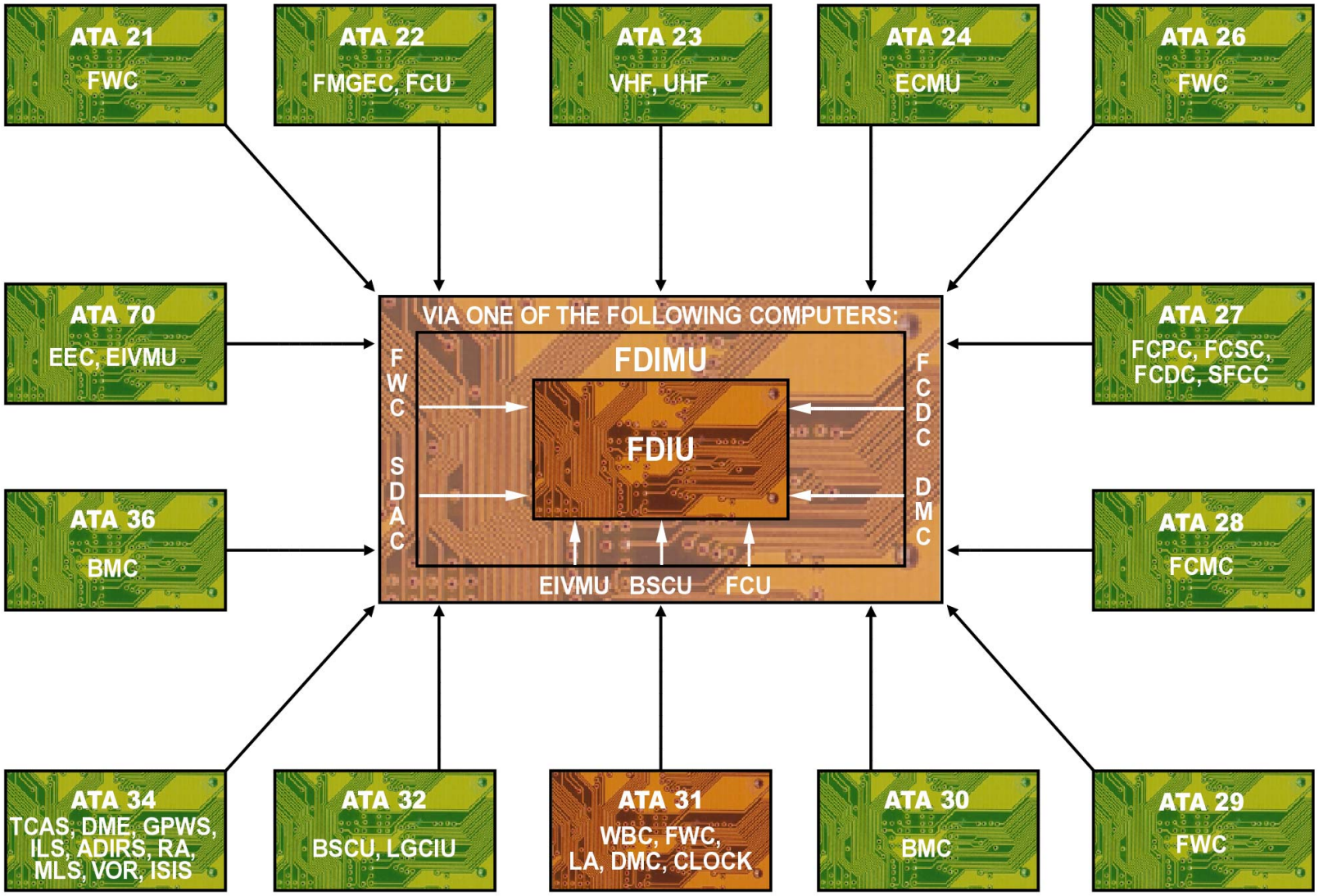
G9409341 - GAUT0T0 - FM31D4F31D30402

DFDRS D/O (3)

DATA SOURCES

Up to 330 mandatory parameters from 30 computers, receivers or transceivers can be transmitted to the FDIU and recorded.

G9409341 - GAUT0T0 - FM31D4F31D30402



DATA SOURCES

G9409341 - GAUT0T0 - FM31D4F31D30402

DFDRS SOURCES D/O (3)

GENERAL

The Flight Data Interface And Management Unit (FDIMU) receives ARINC 429 buses from various computers for A/C and engine data to be recorded by the Digital Flight Data Recorder (DFDR) and the Quick Access Recorder (QAR), if installed. It is also connected by ARINC buses to the Central Maintenance Computer (CMC). The FDIMU is also installed with discrete Inputs/Outputs for Digital Flight Data Recorder System (DFDRS) Coding Panel, pin programming, system status and for the EVENT pushbutton.

SDAC

The FDIMU receives data from each System Data Acquisition Concentrator (SDAC) on an ARINC bus. It sends one discrete signal to each SDAC. The parameters received are the following ones:
- the 3 axes accelerations from the Linear Accelerometer (LA),
- radio communication keying from VHF and HF transceivers,
- AC electrical power bus status from Electrical Contactor Management Units (ECMUs),
- DC electrical power bus status,
- bleed air conditioning and pneumatic ice protection status from Bleed Monitoring Computers (BMCs),
- LP fuel valve position from Electronic Engine Control (EEC) units.

DMC

The FDIMU can receive data from the Display Management Computers (DMCs) on ARINC buses. The parameters received are the following ones:
- Air Data and navigation information from Air Data/Inertial Reference Units (ADIRUs),
- engine information from FADECs units,
- flaps and slats position from Slat Flap Control Computer (SFCCs),
- Auto Flight System (AFS) information from Flight Management Guidance and Envelope Computers (FMGECs),
- radio navigation information from ILS and VOR receivers, Radio Altimeter (RA), Distance Measuring Equipment (DME) and Traffic Collision,
- avoidance system (TCAS) transceivers,
- Electronic Flight Instrument System (EFIS) and flight guidance selection from Flight Control Unit (FCU),
- Electronic Centralized Aircraft Monitoring (ECAM) control and switching panel selections,
- Gross Weight and Center of Gravity from Weight and Balance Computers (WBCs) if installed,
- fuel quantity in trim tank from Fuel Control and Monitoring Computers (FCMCs),
- fuel flow from FADECs.

FWC

The FDIMU receives data from each Flight Warning Computer (FWC) on an ARINC bus. The parameters received are the following ones:
- warnings and computer failures,
- L/G status from Landing Gear Control and Interface Units (LGCIUs),
- ECAM status,
- engine start valve position from BMCs,
- flight phase information.

FCDC

The FDIMU receives data from each Flight Control Data Concentrator (FCDC) on an ARINC bus. The parameters received are the following ones:
- spoiler position and speed brake selection from Flight Control Primary Computers (FCPCs),

G9409341 - GAUT0T0 - FM31D5F31D40602

- roll, pitch and yaw control surface positions and pilot inputs from FCPCs and Flight Control Secondary Computers (FCSCs),
- pitch trim position from FCPCs.

BSCU

The FDIMU receives the brake pressure, auto brake status and pedal positions from the Braking/Steering Control Unit (BSCU) on 2 ARINC buses.

EIVMU

The FDIMU receives data from each Engine Interface and Vibration Monitoring Unit (EIVMU) on an ARINC bus. The parameters received are the following ones:
- engine identification,
- oil quantity,
- engine vibration,
- and HP fuel valve position from FADECs.

CMC

The FDIU sends data to CMC on an ARINC bus and receives data from CMC on another bus. The FDIU dialogues with the CMC for BITE and tests. The FDIMU receives flight number and city pair information from CMC.

EVENT

The FDIMU receives the event signal from the EVENT pushbutton on one discrete input.

DFDRS CODING PANEL

The FDIMU receives the A/C tail number, Airline Ident, Fleet Ident and DFDR record version from the DFDRS Coding Panel on discrete inputs.

The FDIMU receives the A/C type information by pin programming on discrete inputs.

DFDR AND DMU

The FDIU sends the data for recording to the DFDR in Harvard Biphase format on one output bus and receives the playback data in the same format on one input bus. The DFDR status (BITE IN) is transferred with a discrete signal to the SDAC, which transmits information to the FDIU, through an ARINC bus, for the Centralized Maintenance System (CMS). The FDIU Part of the FDIMU sends DFDR parameters to the Data Management Unit (DMU) Part of the FDIMU through an ARINC bus for recording on PCMCIA card, if installed.

CVR

The FDIMU sends to the Cockpit Voice Recorder (CVR) an audio signal with encoded time information, via the Audio Management Unit (AMU), to make the synchronization of the CVR with the DFDR.

CLOCK

The FDIMU receives the time information from the Clock on one ARINC bus.

QAR (OPTION)

The FDIMU sends the data for recording to the QAR in Bipolar RZ format on one bus. The FDIU receives 2 discrete signals for QAR status, sent to the CMC.

ISIS

The Integrated Standby Instrument System (ISIS) indicator replaces the conventional standby instruments. It gives air and inertial data to the FDIU via an ARINC bus.

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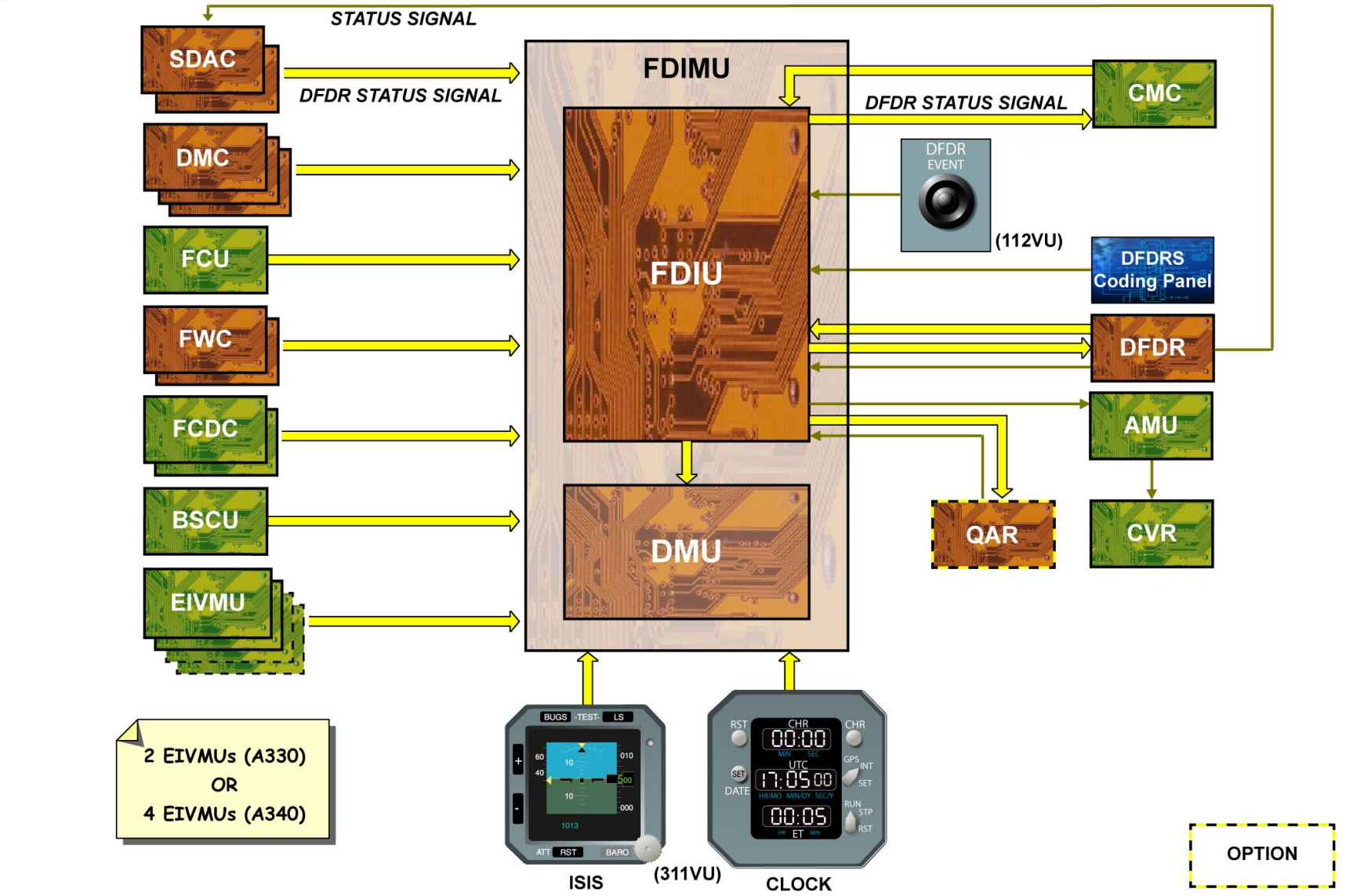

GENERAL ... ISIS

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ACMS GENERAL DESCRIPTION (3)

GENERAL

The main functions of the Aircraft Condition Monitoring System (ACMS) are to monitor the engine condition, APU condition and aircraft performance, as well as trouble shooting assistance. It collects, records and processes aircraft system data, which can be retrieved and viewed through the MCDU, accessible through removable memory, or printed on the aircraft printer.

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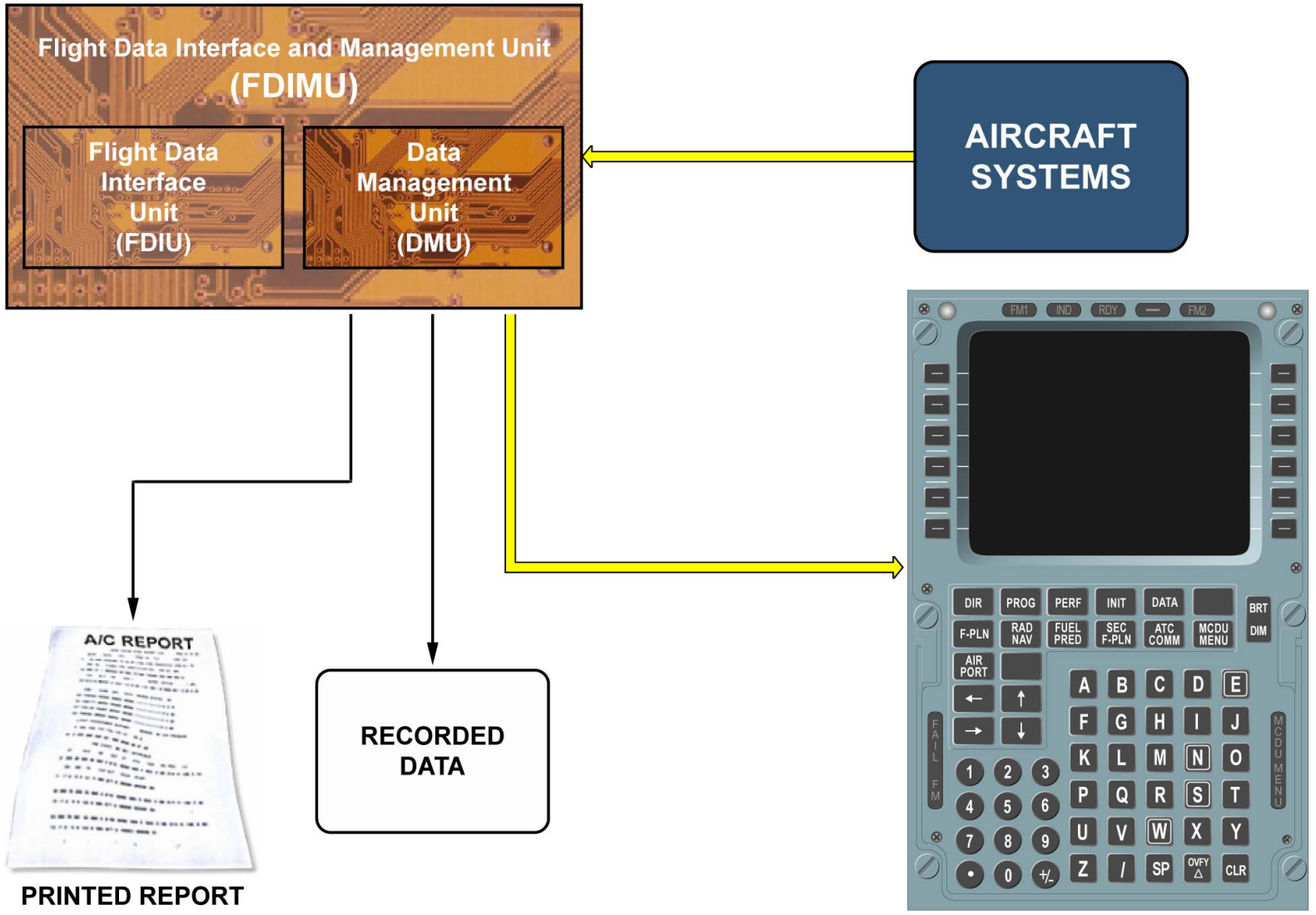

Flight Data Interface and Management Unit
(FDIMU)
Flight Data Interface Unit (FDIU)
Data Management Unit (DMU)
AIRCRAFT SYSTEMS
A/C REPORT
PRINTED REPORT
RECORDED DATA
FM1
IND
RDY
FM2
DIR
PROG
PERF
INIT
DATA
F-PLN
RAD NAV
FUEL PRED
SEC F-PLN
ATC COMM
MCDU MENU
BRT
DIM
AIR PORT
FAIL FM
MCDU MENU
CLR

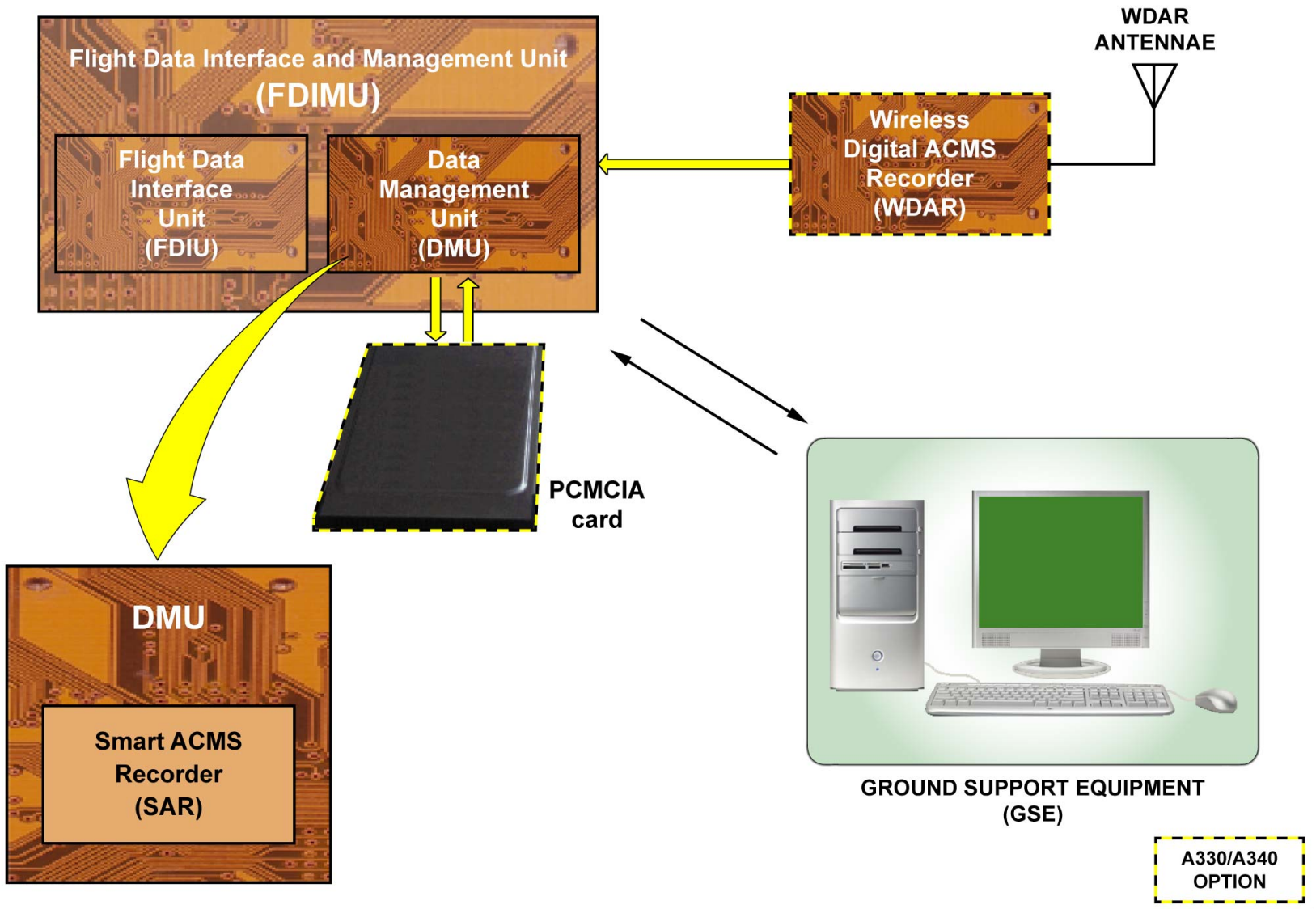
GENERAL

ACMS GENERAL DESCRIPTION (3)

ARCHITECTURE

The ACMS includes:
- the Data Management Unit (DMU) part of the Flight Data Interface and Management Unit (FDIMU) including a Smart ACMS Recorder (SAR), and a Personal Computer Memory Card International Association (PCMCIA) interface,
- an "on-ground" equipment called Ground Support Equipment (GSE),
- an optional Wireless Digital ACMS Recorder (WDAR).

G9409341 - GAUT0T0 - FM31DG000000001



ARCHITECTURE

G9409341 - GAUT0T0 - FM31DG000000001

ACMS GENERAL DESCRIPTION (3)

AIRCRAFT SYSTEMS

Various aircraft systems are connected to the DMU. These input sources give to the DMU engine parameters, APU parameters and aircraft parameters.

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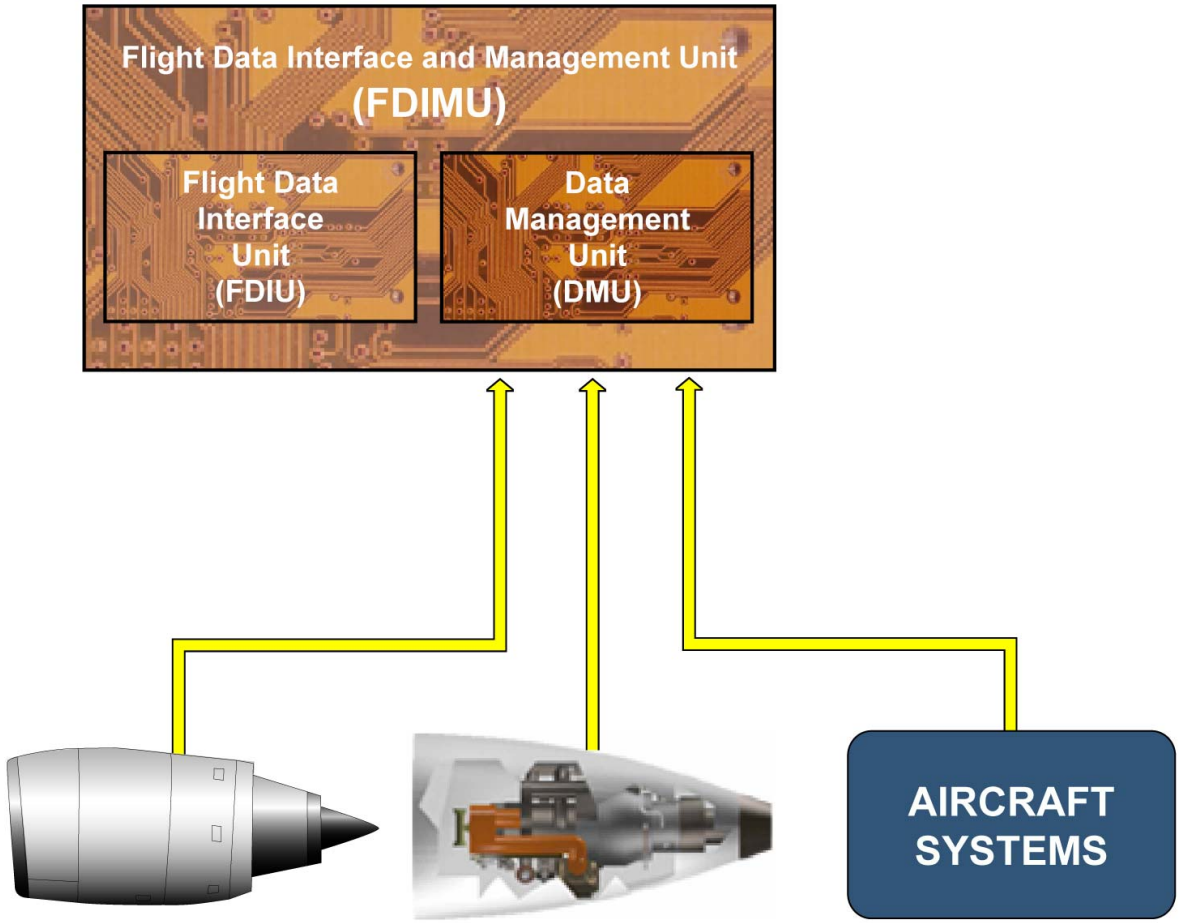


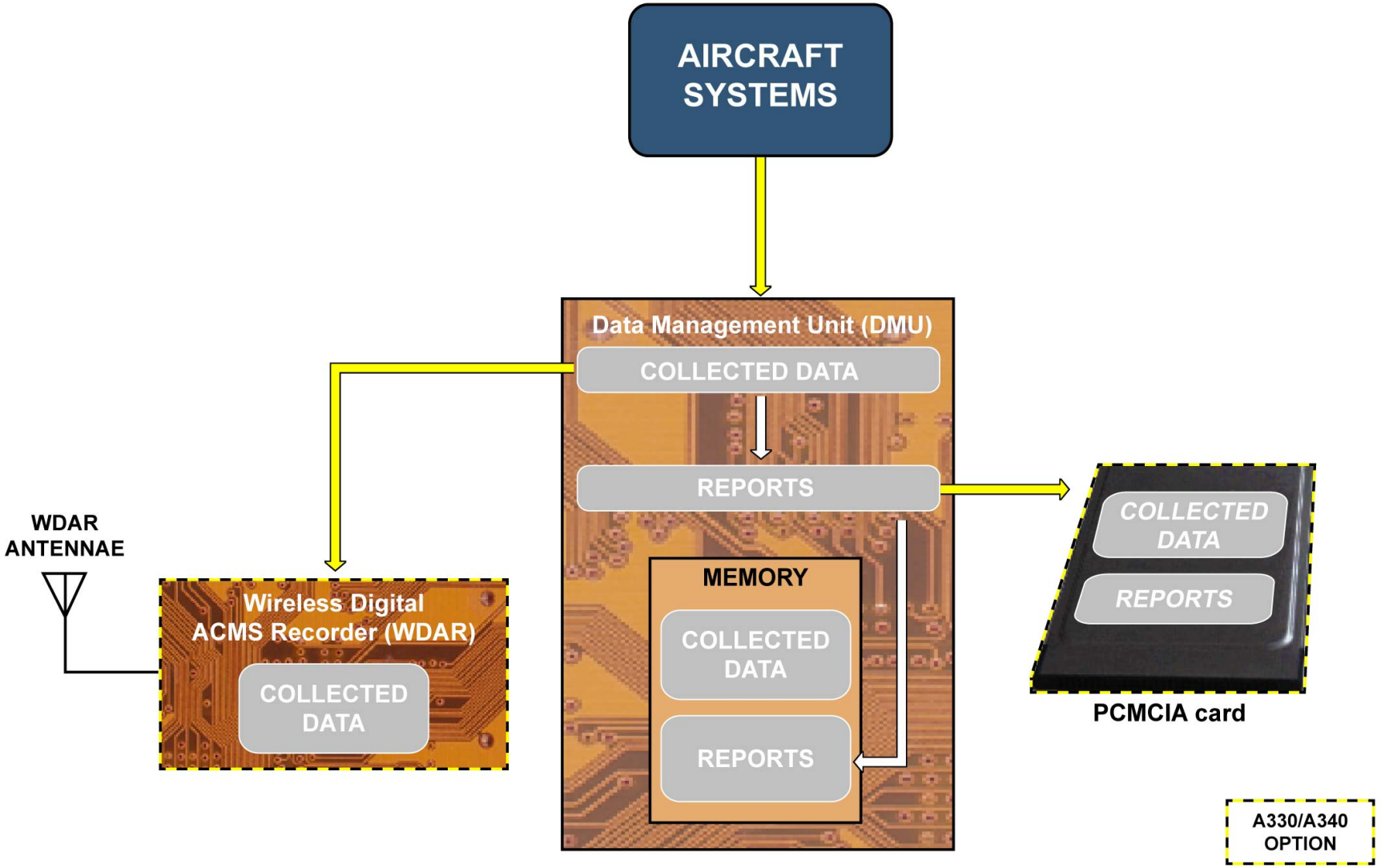
AIRCRAFT SYSTEMS

ACMS GENERAL DESCRIPTION (3)

DMU

The DMU, located in the FDIMU, collects, stores and processes various aircraft system data. This data can be stored in the internal DMU memory, on the PCMCIA card and/or in the WDAR, if installed. The collected data is used to generate various condition reports. These reports can be stored in the internal DMU memory, or on the PCMCIA card.

G9409341 - GAUT0T0 - FM31DG000000001



DMU

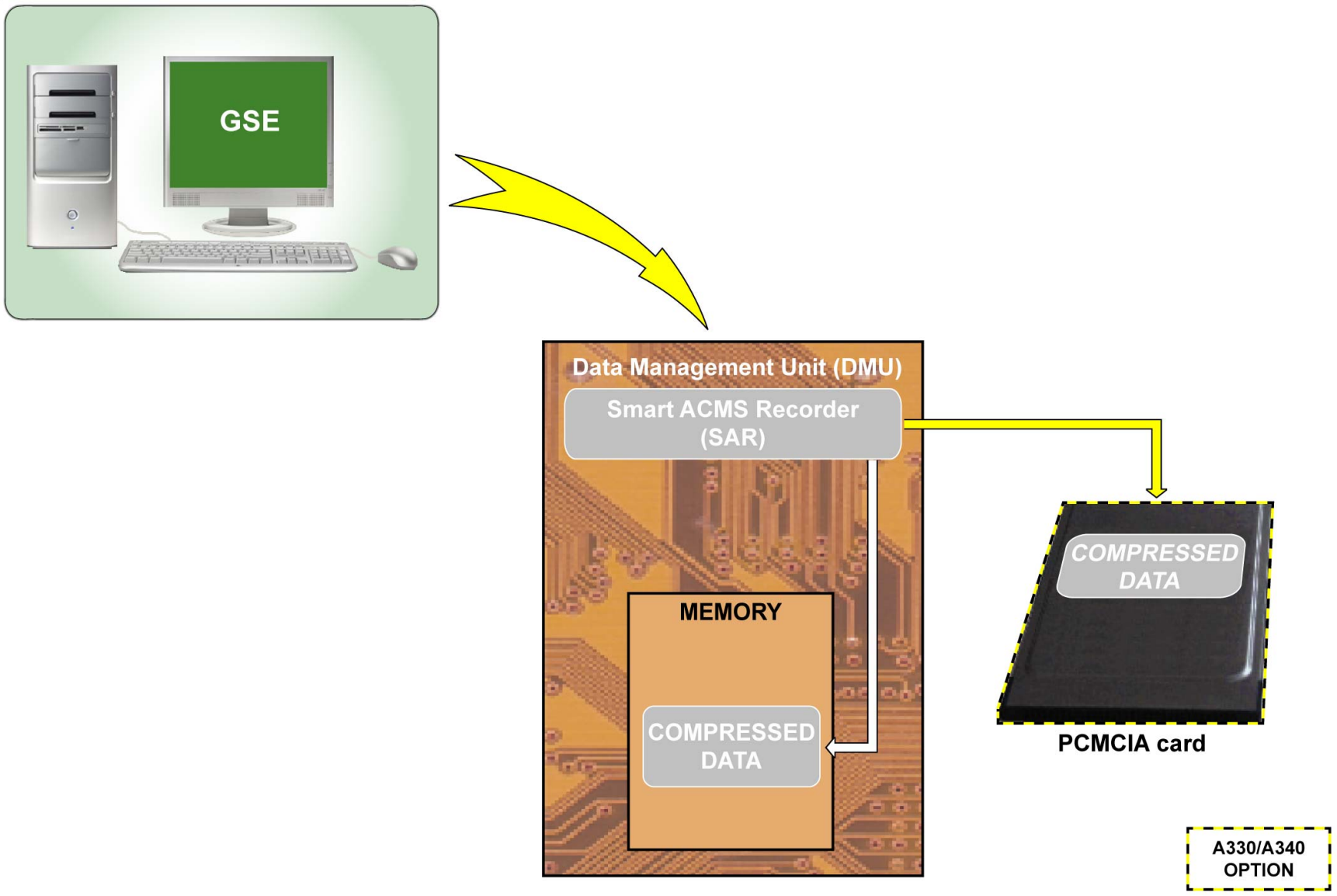
G9409341 - GAUT0T0 - FM31DG000000001

ACMS GENERAL DESCRIPTION (3)

SMART ACMS RECORDER (SAR)

The SAR is a DMU function. This function can make the recording of compressed data, programmable through the GSE. SAR data can be stored in the internal DMU memory, or on the PCMCIA card.

G9409341 - GAUT0T0 - FM31DG000000001



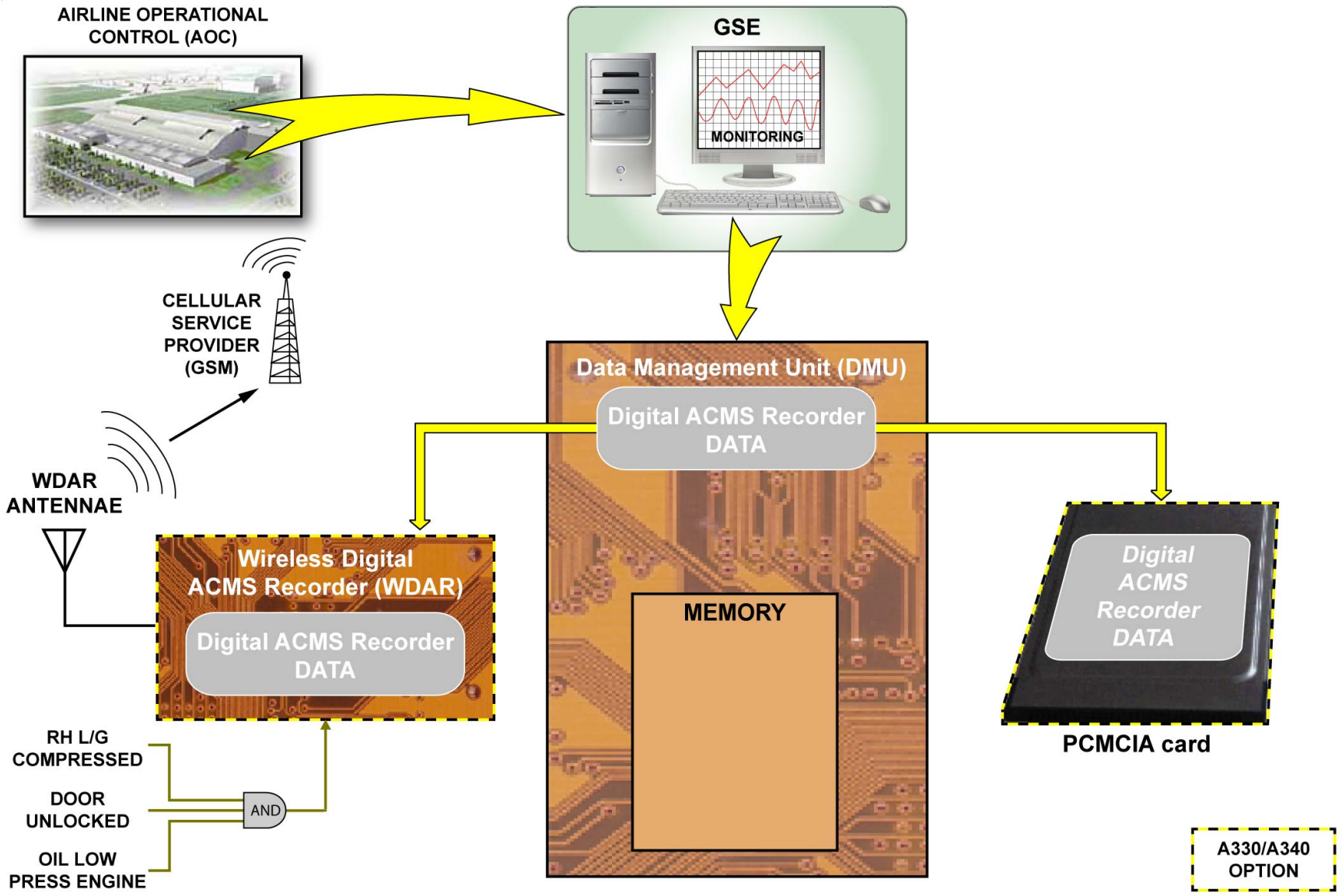
SMART ACMS RECORDER (SAR)

ACMS GENERAL DESCRIPTION (3)

WIRELESS DIGITAL ACMS RECORDER (WDAR)

The purpose of the WDAR is to record data for on ground performance, maintenance or condition monitoring tasks. The wireless transmission mode of the WDAR (if installed) initiates only when the A/C is on the ground, via a cellular service provider (i.e: Global System for Mobile Communication). The electrical power of the mobile units is controlled by 3 interlock signals. Preprogrammed selection of data can be done through the GSE. DAR data can also be stored on 2 specific PCMCIA cards in the WDAR or on the PCMCIA card of the DMU. The WDAR is equipped with 2 antennas mounted on his front face, due to this it is not necessary to install external antennas.

G9409341 - GAUT0T0 - FM31DG000000001



WIRELESS DIGITAL ACMS RECORDER (WDAR)

G9409341 - GAUT0T0 - FM31DG000000001

ACMS GENERAL DESCRIPTION (3)

FDIU

The Flight Data Interface Unit (FDIU) part of the FDIMU sends the same parameters as the Digital Flight Data Recorder (DFDR) to the DMU. These parameters can be recorded on the PCMCIA card.

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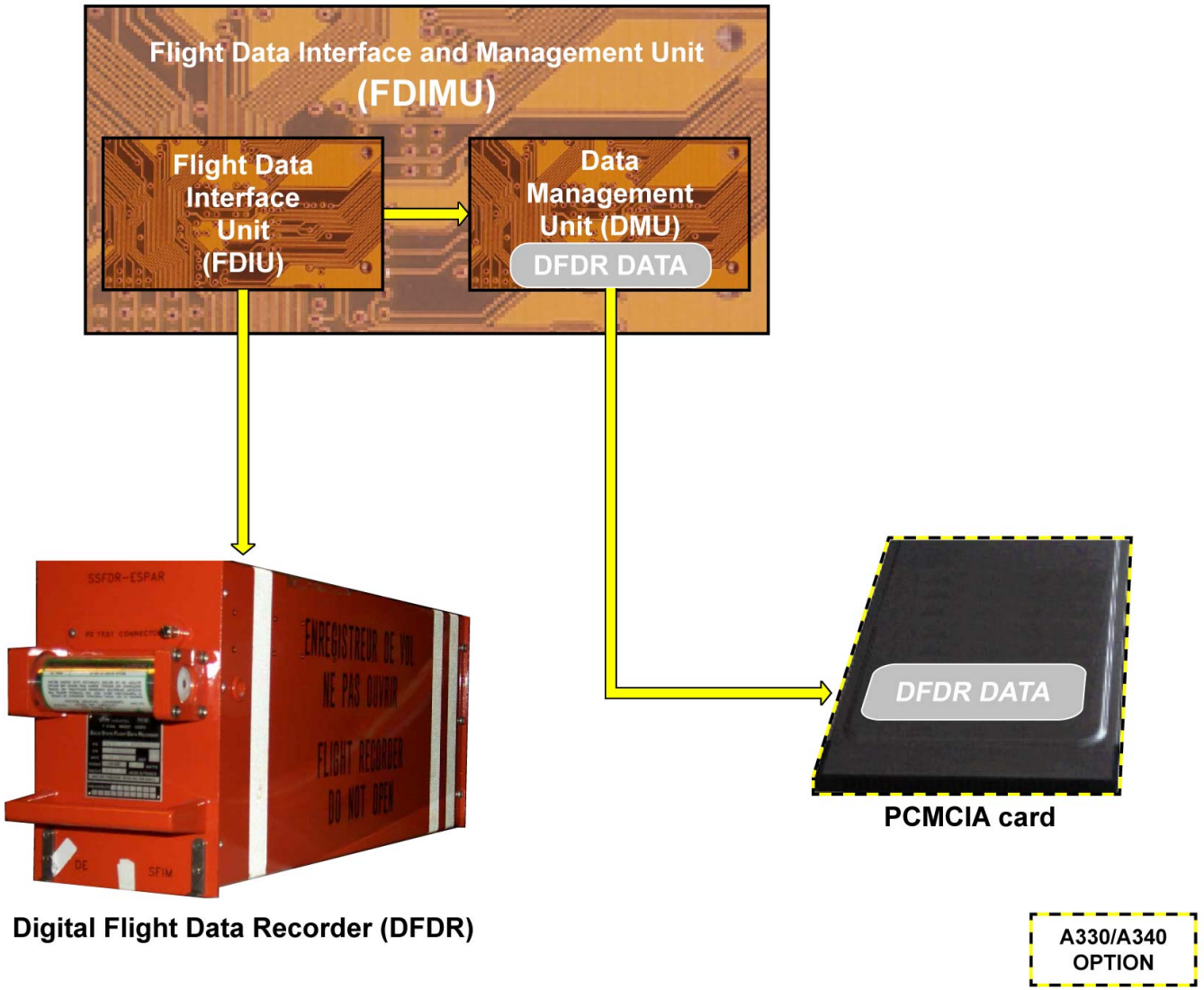

Digital Flight Data Recorder (DFDR)

FDIU

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ACMS GENERAL DESCRIPTION (3)

PCMCIA INTERFACE

The PCMCIA interface accepts high capacity and removable PCMCIA card. ACMS reports, SAR data, DFDR data and DAR data are stored on the PCMCIA card. The disk space ratio is programmable by the GSE. The PCMCIA interface can also be used as a portable data loader to upload FDIMU software and database, or to download recorded data.

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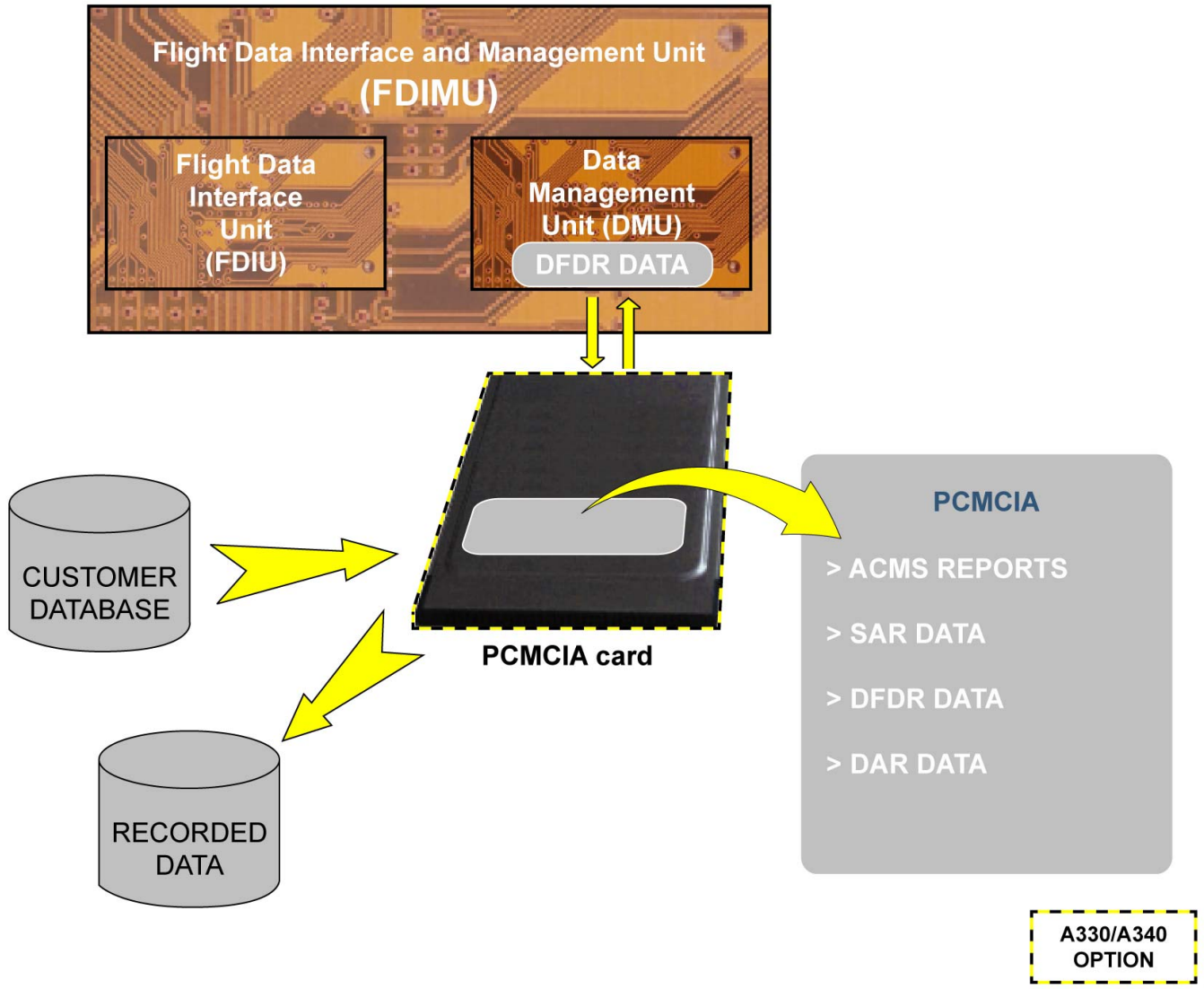

PCMCIA INTERFACE

ACMS GENERAL DESCRIPTION (3)

GSE

The GSE is based on a compatible personal computer able to read 3.5 inch floppy disks and/or PCMCIA cards. The GSE software supplies the following main functions:
- reconfiguration function,
- and readout function.

The reconfiguration function is used for the configuration of the customer database (trigger conditions, layout of recording space...). The readout function is used for display, print out and analysis of recorded data.

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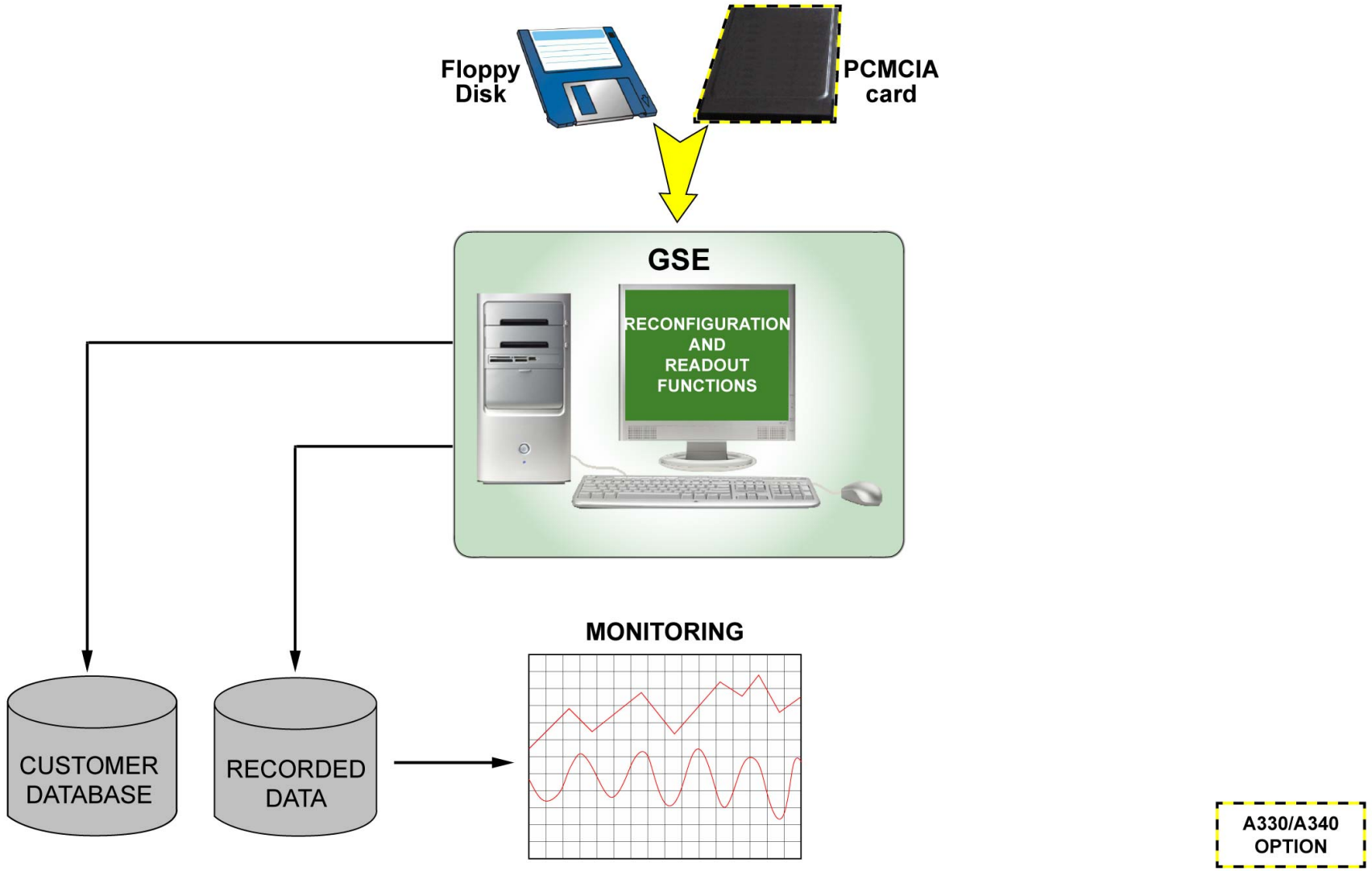

GSE

G9409341 - GAUT0T0 - FM31DG000000001

ACMS GENERAL DESCRIPTION (3)

MDDU

The Multipurpose Disk Drive Unit (MDDU) is used with a 3.5 inch floppy disk to:
- upload data into the FDIMU (operational software, customer database),
- download data for GSE analysis (reports, SAR data).

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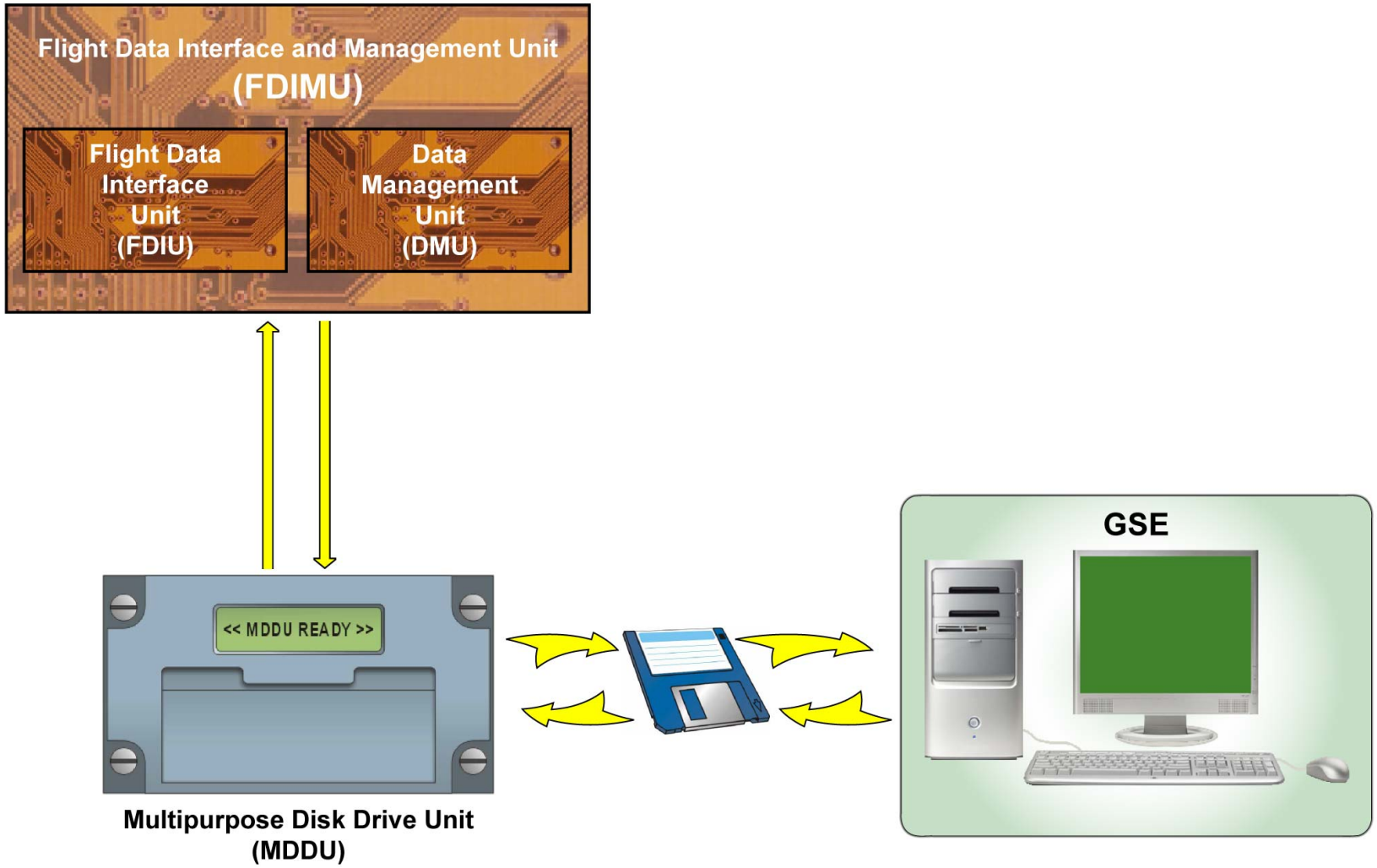
Flight Data Interface and Management Unit
(FDIMU)
Flight Data Interface Unit (FDIU)
Data Management Unit (DMU)
<< MDDU READY >>
Multipurpose Disk Drive Unit
(MDDU)
GSE

MDDU

ACMS GENERAL DESCRIPTION (3)

MCDU

The MCDUs 2 and 3 are connected to the FDIMU to display data, program and also control the system. Compared to the GSE, the programming facilities offered by the MCDU are very limited. The main functions of the MCDU within the ACMS are:
- online display of selected parameters,
- display of the list of the stored reports and Smart ACMS Recorder files,
- manual request of reports and SAR / DAR recording.

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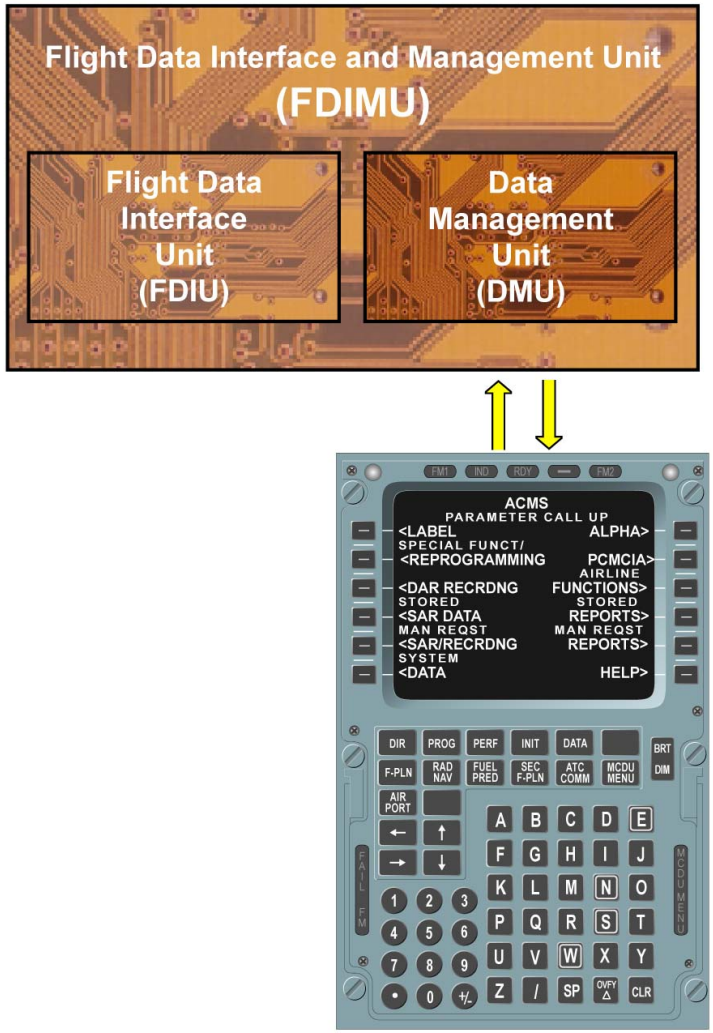


MAIN FUNCTIONS OF MCDU ACMS MENU:

- ✓ PARAMETERS DISPLAY,
- ✓ STORED DATA LISTING,
- ✓ MANUAL REQUESTS.

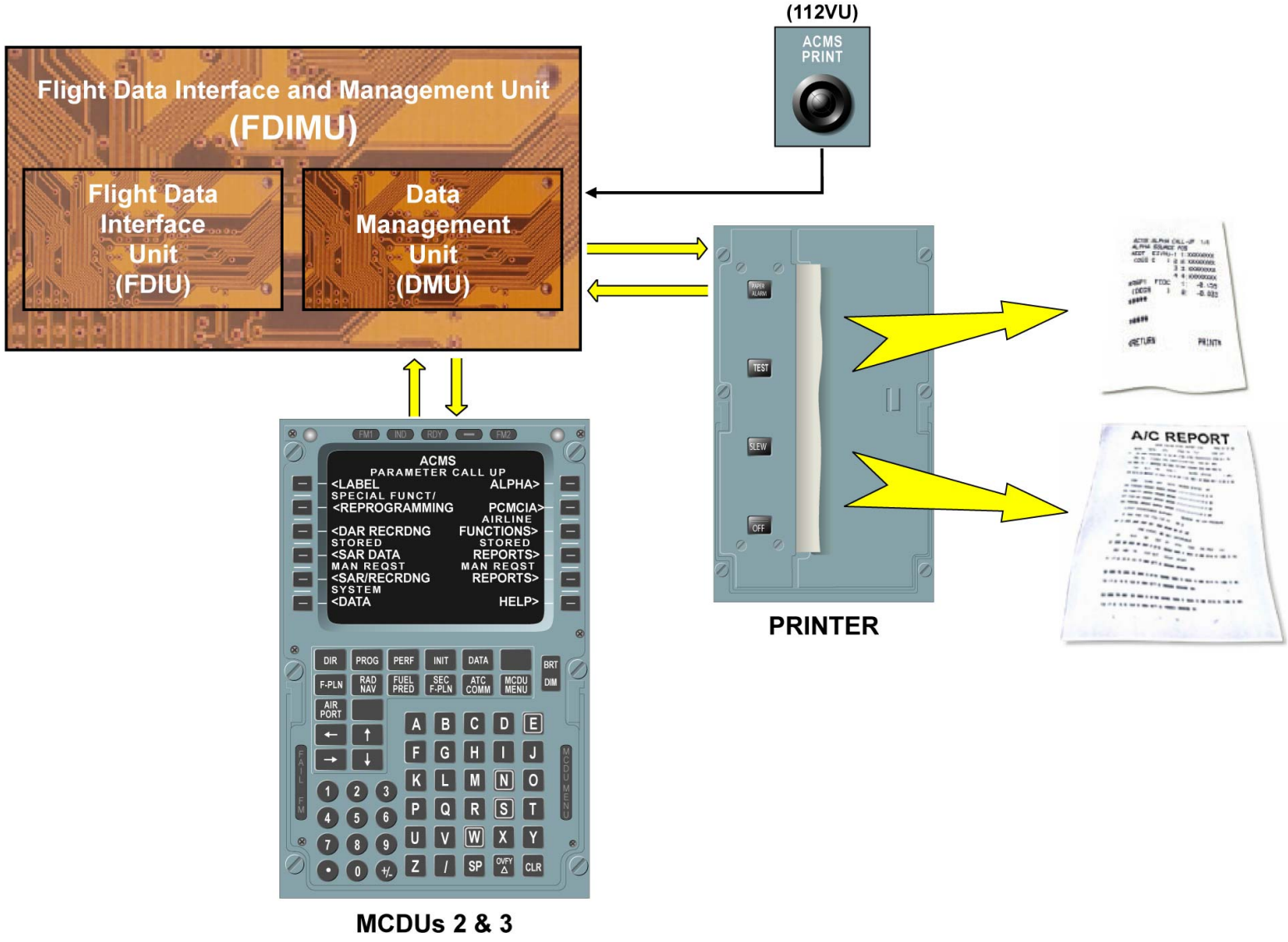
MCDU

ACMS GENERAL DESCRIPTION (3)

PRINTER

The printer is used to print reports generated by the DMU as well as most of the ACMS MCDU displays. The printer can be automatically controlled by the DMU, manually controlled from the MCDU or activated using the ACMS PRINT P/B.

G9409341 - GAUT0T0 - FM31DG000000001


(112VU)
ACMS
PRINT
Flight Data Interface and Management Unit
(FDIMU)
Flight Data Interface Unit (FDIU)
Data Management Unit (DMU)
PAPER ALARM
TEST
SLEW
OFF
PRINTER
A/C REPORT
ACMS
PARAMETER CALL UP
<LABEL
ALPHA>
SPECIAL FUNCT/
<REPROGRAMMING
PCMCIA>
AIRLINE
<DAR RECRDNG
FUNCTIONS>
STORED
STORED
<SAR DATA
REPORTS>
MAN REQST
MAN REQST
<SAR/RECRDNG
REPORTS>
SYSTEM
<DATA
HELP>
MCDUs 2 & 3

PRINTER

ACMS GENERAL DESCRIPTION (3)

ATSU

The Air Traffic Service Unit (ATSU) can be used to send reports and to broadcast parameters generated by the FDIMU to a ground station via radio transmission. The download of reports can be automatically initiated by the DMU, or manually initiated from the MCDU. The ATSU can also receive and send to the FDIMU, requests from the ground.

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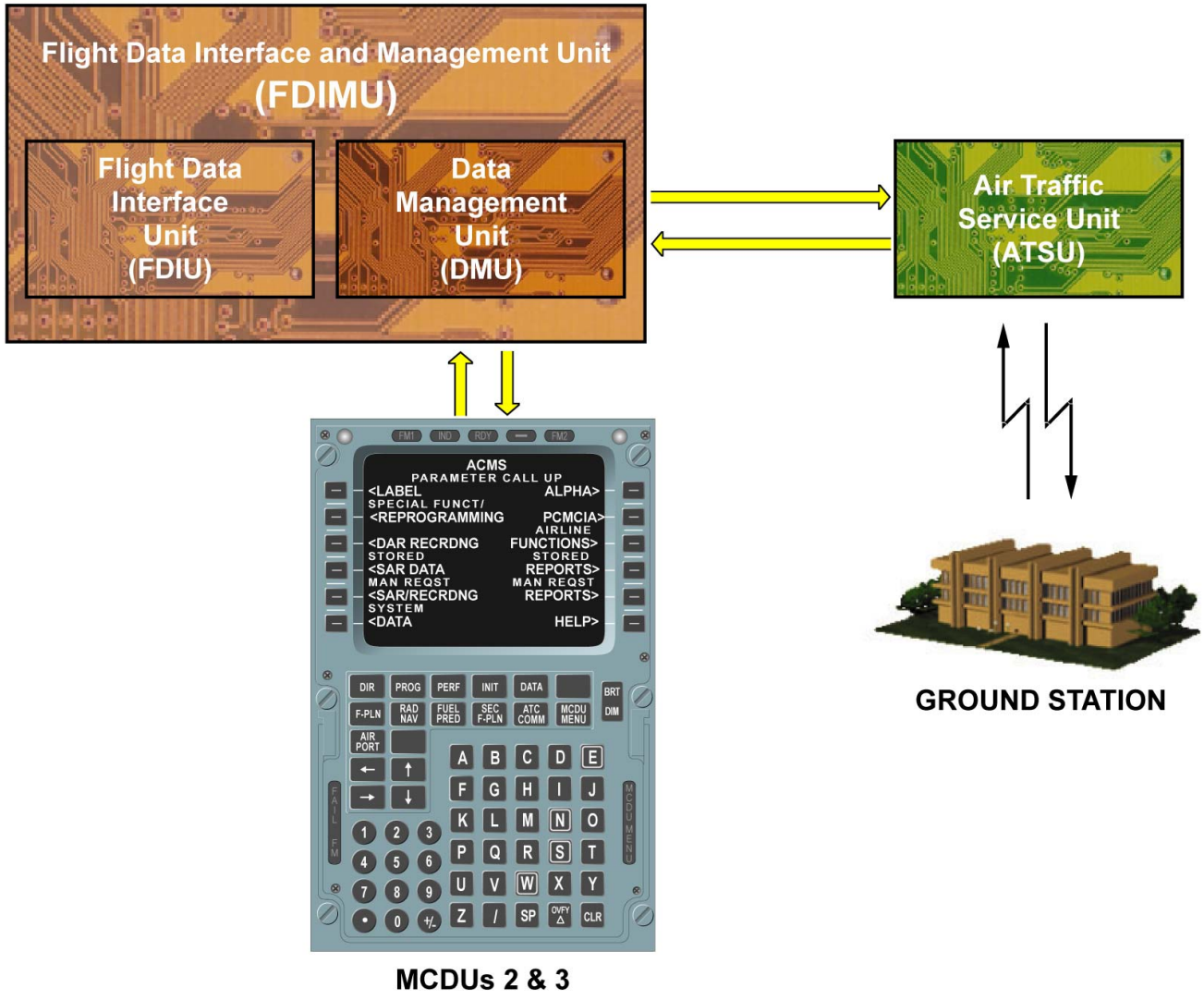
Flight Data Interface and Management Unit
(FDIMU)
Flight Data Interface Unit (FDIU)
Data Management Unit (DMU)
Air Traffic Service Unit (ATSU)
ACMS
PARAMETER CALL UP
<LABEL
SPECIAL FUNCT/
<REPROGRAMMING
<DAR RECRDNG
STORED
<SAR DATA
MAN REQST
<SAR/RECRDNG
SYSTEM
<DATA
ALPHA>
PCMCIA>
AIRLINE
FUNCTIONS>
STORED
REPORTS>
MAN REQST
REPORTS>
HELP>
GROUND STATION
MCDUs 2 & 3

ATSU

ACMS D/O (3)

FDIMU

The Flight Data Interface Management System is controlled by the Flight Data Interface Management Unit (FDIMU). The FDIMU integrates the former Flight Data Interface Unit (FDIU) (Digital Flight Data Recording System (DFDRS) function) and Digital Management Unit (DMU) (Aircraft Condition Monitoring System (ACMS) function) with PCMCIA interface into a single LRU. These two functions operate independently from each other. The FDIU section is dedicated to the flight data recording system for incident/accident investigation. The DMU section is used to monitor aircraft systems condition, mainly engines and APU systems, as well as aircraft performance in order to schedule maintenance tasks, operation recommendations to be formulated, and trouble shooting assistance. In addition, for PCMCIA recording purposes, data transmission from the FDIU part to the DMU part is given through an internal ARINC 429 data bus.

DMU

The DMU part is the heart of the ACMS. The main function of the DMU part is to generate reports or/and to record raw data from aircraft system data collected and continuously monitored by the DMU. The data is received from aircraft systems via low speed (12Kb/s) or high-speed (100Kb/s) ARINC 429 data buses and discrete inputs. This data is stored into buffer memories and retrieved to provide, if required, pre-event data for report generation and/or raw data recording.
In addition to the data recording, specific trigger conditions are programmed in the DMU, using a Ground Support Equipment (GSE). When a preprogrammed trigger condition is detected by DMU monitoring, the DMU part software generates automatically preformatted ACMS reports or/and records automatically raw data surrounding this specific event. The DMU stores these reports on its internal non-volatile Solid State Mass Memory (SSMM). The reports can also be stored on the PCMCIA memory card if installed. The DMU stores the sets of raw data on an external optional Wireless Digital ACMS Recorder (WDAR) or/and compresses and stores this data on its memory (Smart ACMS Recorder function). The Smart ACMS Recorder (SAR) and WDAR data can also be recorded on the PCMCIA memory card, if installed. The DMU has a BITE function that reports the ACMS status to the CMS. Note that the ACMS function is very flexible and allows, through the GSE, to customize or create triggering conditions, reports and sets of raw data as well as make partitioning of the DMU's SSMM between reports, SAR data and buffers.

REPORTS

The DMU part generates a set of preprogrammed ACMS reports functional at A/C, called Airbus Standard Reports. These ACMS reports are defined and validated by Airbus for:
- aircraft performance monitoring,
- engine monitoring,
- APU monitoring,
- miscellaneous monitoring functions related to structure, RAT, ECS and door monitoring,
- Trouble-shooting and in-depth investigation.

If needed, 3 additional reports called "free programmable reports" may be customized. A report includes a fixed and comprehensive set of data collected under predefined triggering logic and call-up through call-up codes. The ACMS reports may also be triggered either by a manual request via the ACMS remote Print button, or via an ATSU up-link request. Finally the ACMS reports can be:
- printed out on the cockpit printer in flight or on ground,
- collected and retrieved via the PCMCIA memory card,
- downloaded on ground only from the ACMS memory via the MDDU or via the PCMCIA interface card,
- down linked through ACARS function (ATSU) in flight or on ground.

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SAR FUNCTION

The SAR function supplies compressed recordings of a predefined set of raw data related to particular flight events. This data set is stored in the DMU part SSMM and, if programmed, in the PCMCIA card as well. The SAR recording can be triggered:
- automatically when programmable triggers are met,
- manually via the MCDU.

The memory of the DMU is dedicated to the SAR. It is split into separate channels (up to 8) with different sizes used to store the SAR files. Each channel can have up to 32 programmable start/stop triggering conditions running simultaneously and fully customized. When a triggering condition is met, a new SAR file is opened and is used to store the corresponding predefined compressed data. In addition, each channel can be programmed to record pre-event data for extended trouble shooting. SAR data is not directly accessible on-board. SAR data files are dumped on ground only via the MDDU or via the PCMCIA interface, either automatically or manually. Data is then converted into graphs or lists using the READOUT function of the GSE. The only information available on-board the aircraft is related to SAR file characteristics displayed on the MCDU. The Airbus standard default SAR programming has no channels defined or automatic triggers programmed. The user must initiate all programs.

WDAR FUNCTION

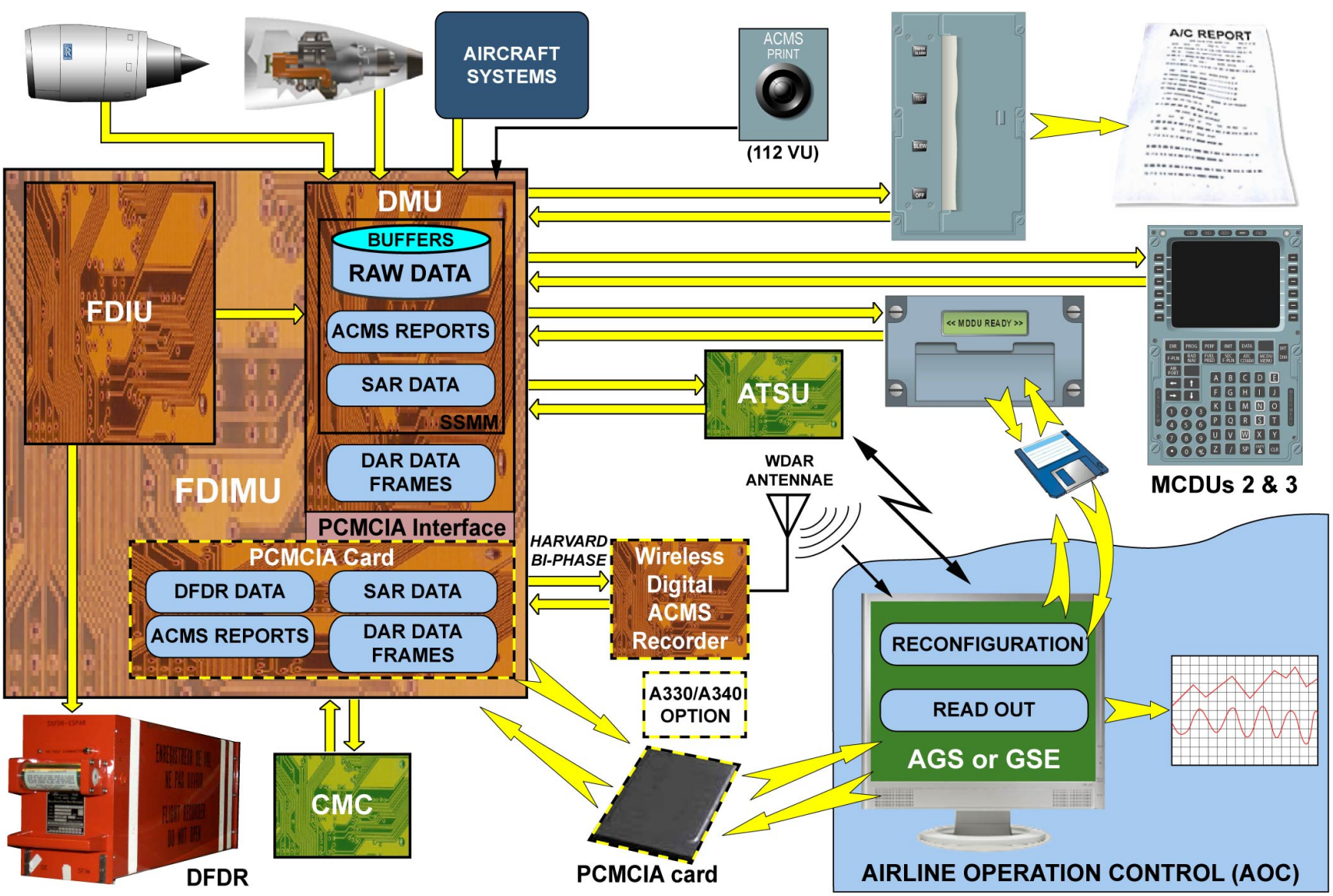
The optional Wireless Digital ACMS Recorder (WDAR) records the raw data sent by the DMU part on frames like the DFDR. WDAR recording activation can be:
- automatic by pre-programmed logical aircraft event triggers (up to 64 GSE programmed triggers available),
- manual through the MCDU,
- continuous during the entire flight,
- continuous or intermittent during a specific flight phase.

The WDAR memory report is then read out by a specific WDAR Analysis Ground Station (AGS) and used for long-term trend monitoring and short-term trouble shooting. The WDAR recording speed can be set from 64 word/second up to 1024 word/second by using GSE. The Airbus standard default WDAR programming has a pre-defined 64-word/second-frame format but with no automatic triggers defined.
The WDAR includes a BITE function, which reports the status to the DMU. Two PCMCIA card are part of the WDAR. If there are not installed the "Fail" LED will be "ON" on the front face.
The wireless transmission mode of the WDAR (if installed) initiates only when the A/C is on the ground, via a cellular service provider (i.e: Global System for Mobile Communication), trough 4 or 8 GSM/GPRS modules. The automatic transmission is allowed thanks to additional discrete signals (ground condition, one door open, engine master switch OFF for A340 only).

PCMCIA BOARD AND INTERFACE

The PCMCIA board supplies an interface in order to:
- store ACMS reports as well as WDAR and SAR data independently from the recording done in the DMU and in the WDAR.
- store DFDRS control flight parameters independently from the recording done in the Quick Access Recorder (QAR).
- upload ACMS system software and ACMS setup database.
- download ACMS reports and raw data (Smart ACMS Recorder).

The PCMCIA board is managed by the DMU processor and is accessible through an access door on the FDIMU front face. The PCMCIA board accepts removable PCMCIA cards that can provide up to 256 Mbytes of Memory used for inputs/outputs for file transfer oriented devices. These cards are not delivered with the FDIMU box.



FDIMU ... PCMCIA BOARD AND INTERFACE

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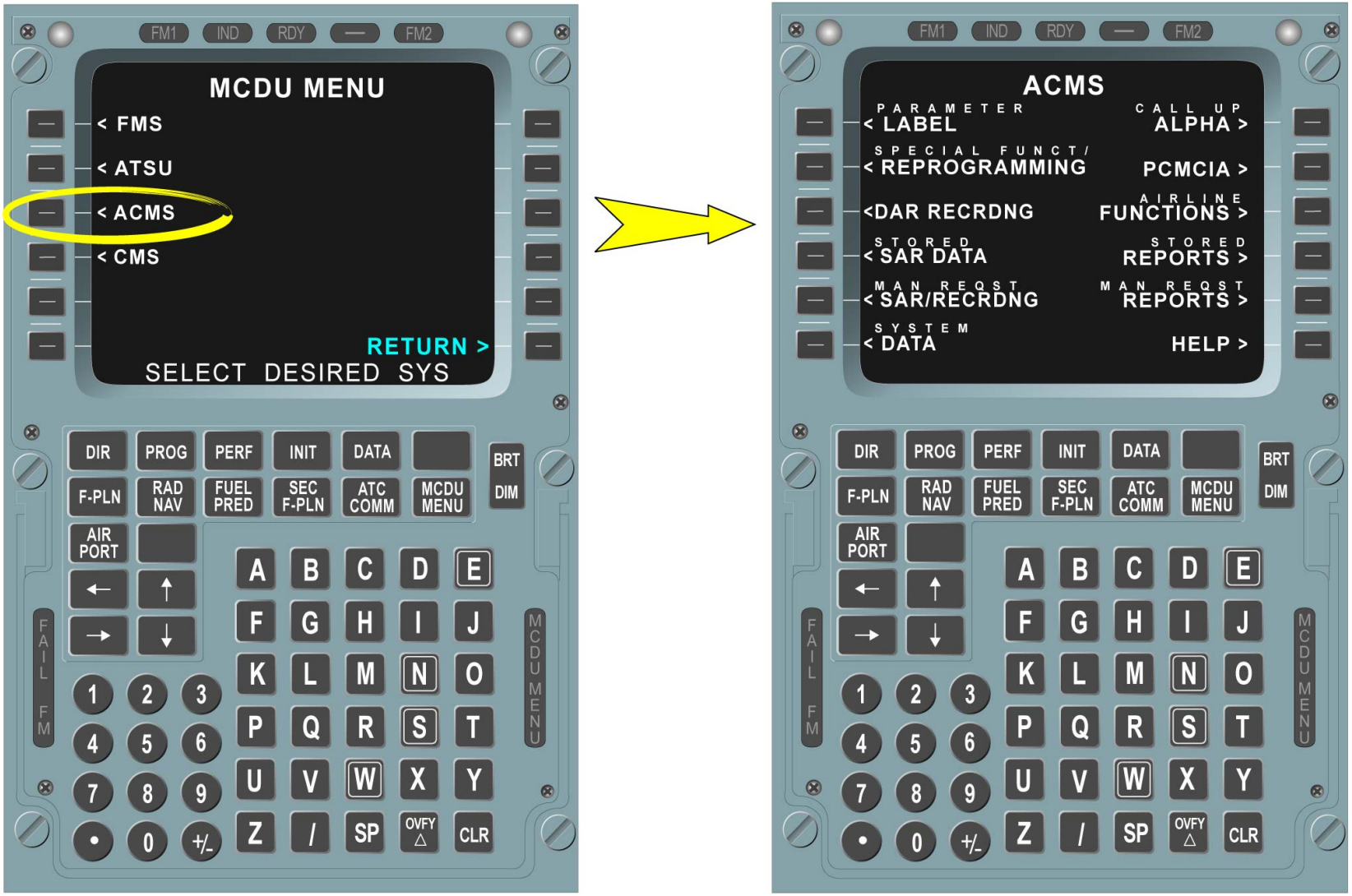
ACMS D/O (3)

MCDU MAIN ACMS MENU

The operator has the ability to display any FDIMU aircraft digital data via MCDU 2 and 3 by selecting the ACMS menu page. Most ACMS pages are shown in this module.



MCDU MAIN ACMS MENU

ACMS D/O (3)

PARAMETER ALPHA

For the 300 parameters, which have an alphanumeric code, the selection is possible by the alpha call-up function. This page displays alpha call-ups and the definition of alpha call-up sets, which can be recalled at a later date. The ALPHA MENU DISPLAY key displays 8 pages with up to 5 alpha call-ups per page. The display read out is directly given in engineering units. The alpha call-up is identified in the form of alphanumeric codes, for example EGT (max. 4 digits). To get information about a given system it is possible to extend the alpha call-up code by the system number, for example, EGT 1.
The alpha code is displayed on the MCDU with the data source and the parameter values in real time and refreshed once per second. A dash symbol indicates that the data is not being updated; a series of crosses indicates that the parameter is invalid. The ALPHA MENU CLEAR key is used to clear the current alpha call-up entries. The ALPHA LIST key provides the list of the available alpha call-ups. If a letter is specified, the list will display only alpha call-ups starting with this letter.
The SETUP NAME key is used to define the name for a set of alpha call-ups. Up to 8 sets of 40 alpha call-ups are possible. Storing or deleting of call-ups is available. The bottom of the screen shows the name of the 8 sets stored, so they are easily recalled in a future MCDU session.
The PRINT RECORD START key prints out the alpha calls-up in time series of 1-second intervals. Previously the recording time in seconds (up to 30), must be entered.

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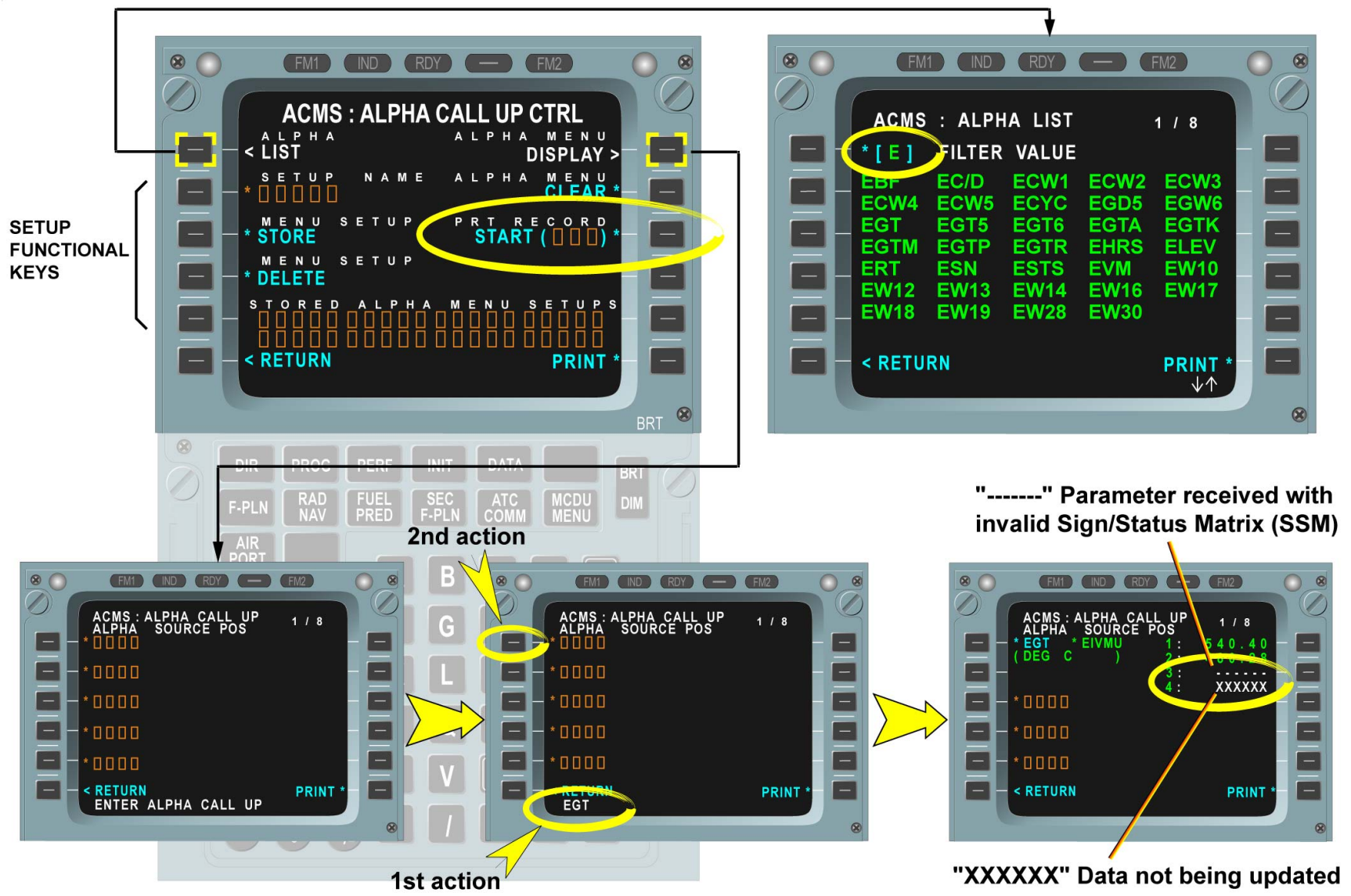

SETUP FUNCTIONAL KEYS
ACMS : ALPHA CALL UP CTRL
ALPHA < LIST
ALPHA MENU DISPLAY >
SETUP NAME
ALPHA MENU CLEAR *
MENU SETUP * STORE
PRT RECORD START ( ) *
MENU SETUP * DELETE
STORED ALPHA MENU SETUPS
< RETURN
PRINT *
BRT
ACMS : ALPHA LIST 1 / 8
* [E] FILTER VALUE
EBF EC/D ECW1 ECW2 ECW3
ECW4 ECW5 ECYC EGD5 EGW6
EGT EGT5 EGT6 EGTA EGTK
EGTM EGTP EGTR EHRS ELEV
ERT ESN ESTS EVM EW10
EW12 EW13 EW14 EW16 EW17
EW18 EW19 EW28 EW30
< RETURN
PRINT *
DIR PROG PERF INIT DATA
F-PLN RAD NAV FUEL PRED SEC F-PLN ATC COMM MCDU MENU
AIR PORT
BRT DIM
2nd action
ACMS : ALPHA CALL UP ALPHA SOURCE POS 1 / 8
< RETURN ENTER ALPHA CALL UP
PRINT *
EGT
1st action
"-------" Parameter received with invalid Sign/Status Matrix (SSM)
* EGT (DEG C) * EIVMU
1: 540.40
3: -------
4: XXXXXX
"XXXXXX" Data not being updated

PARAMETER ALPHA

G9409341 - GAUT0T0 - FM31D6ACMSDO002

ACMS D/O (3)

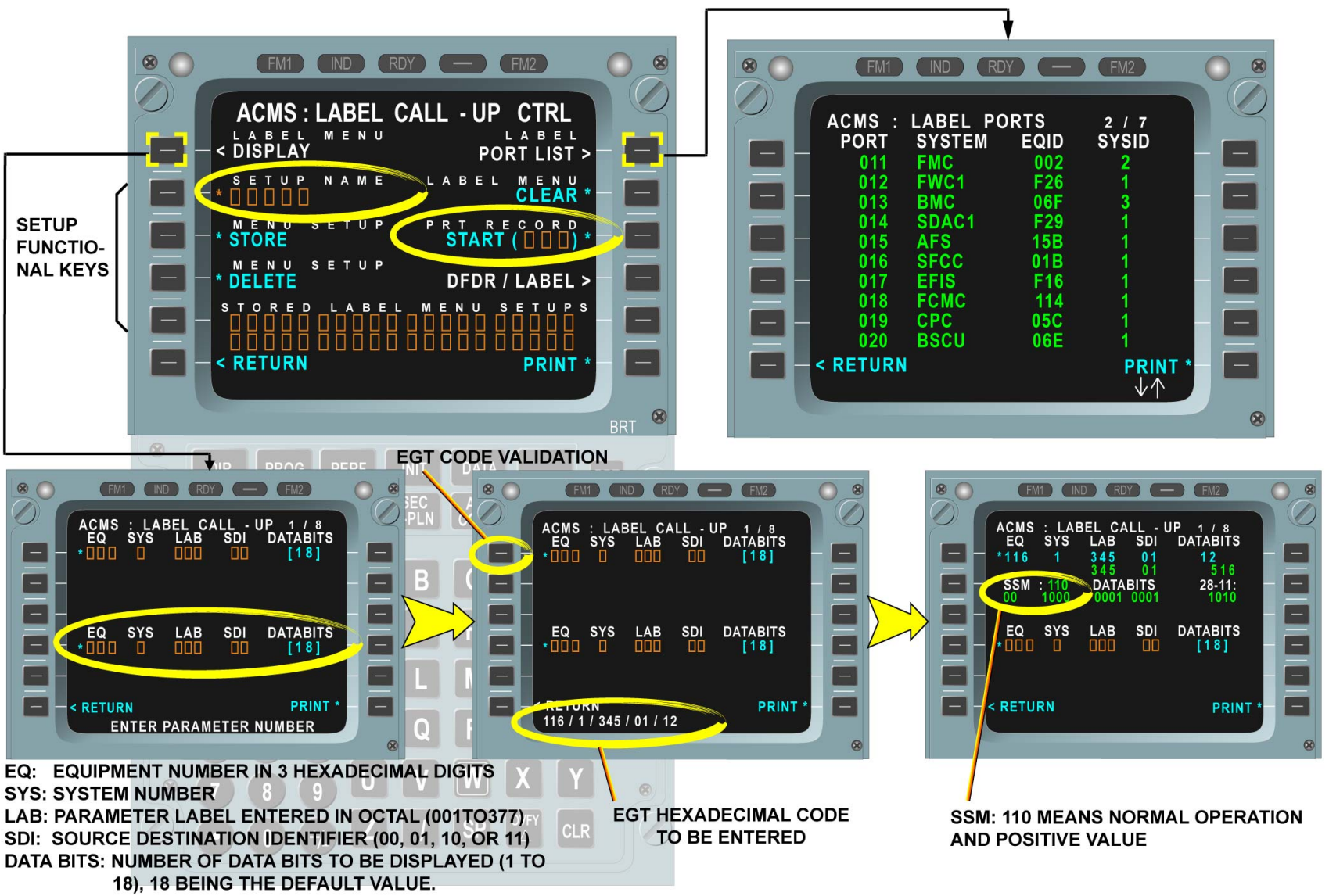
PARAMETER LABEL

The FDIMU (DMU part) permits direct access to all parameters transmitted on the ARINC 429 data buses connected to the DMU function for on line display. The ACMS LABEL CALL-UP Control page enables the access to the display of label call-ups and the definition of label call-up sets. The LABEL MENU DISPLAY function enables the display of 8 pages with up to 2 label call-up parameters per page. The display read out is in binary form. The Label call-up selection is made by entering the Equipment Identification (EQ) system number, Label, and the Source/Destination Identifier (SDI) values. Each parameter is separated by a slash.

As an example EGT value:

The EGT value is given in real time and refreshed once per second. The line below the ARINC parameter characteristics contains the label (345), the SDI (01), and the decimal value (516) of the selected data bits. In the next data lines the SSM bits and the binary data field of the selected parameters are displayed. In the example, only 12 bits of the data field are significant (bit 28 to bit 17). The LABEL PORT LIST key displays a list of DMU input ports with the connected computers and the equipment/system identifications. The SETUP NAME key is used to define the name of a set, up to 8 sets of 16 label call-ups is possible. The Storing or the deleting of label call-ups remain available. The bottom of the screen shows the name of the 8 sets stored, they are easily recalled in a future MCDU session. The PRINT RECORD START key prints out the label calls-up in time series of 1 second intervals. Previously the recording time in seconds (up to 30) must be entered.

G9409341 - GAUT0T0 - FM31D6ACMSDO002


ACMS : LABEL CALL - UP CTRL
LABEL MENU
< DISPLAY
LABEL
PORT LIST >
SETUP NAME
LABEL MENU
CLEAR *
MENU SETUP
* STORE
PRT RECORD
START ( ) *
MENU SETUP
* DELETE
DFDR / LABEL >
STORED LABEL MENU SETUPS
< RETURN
PRINT *
BRT
SETUP FUNCTIO-NAL KEYS
ACMS : LABEL PORTS 2 / 7
PORT SYSTEM EQID SYSID
011 FMC 002 2
012 FWC1 F26 1
013 BMC 06F 3
014 SDAC1 F29 1
015 AFS 15B 1
016 SFCC 01B 1
017 EFIS F16 1
018 FCMC 114 1
019 CPC 05C 1
020 BSCU 06E 1
< RETURN
PRINT *
EGT CODE VALIDATION
ACMS : LABEL CALL - UP 1 / 8
EQ SYS LAB SDI DATABITS
[18]
ENTER PARAMETER NUMBER
116 / 1 / 345 / 01 / 12
*116 1 345 01 12
345 01 516
SSM : 110 DATABITS 28-11:
00 1000 0001 0001 1010
EQ: EQUIPMENT NUMBER IN 3 HEXADECIMAL DIGITS
SYS: SYSTEM NUMBER
LAB: PARAMETER LABEL ENTERED IN OCTAL (001TO377)
SDI: SOURCE DESTINATION IDENTIFIER (00, 01, 10, OR 11)
DATA BITS: NUMBER OF DATA BITS TO BE DISPLAYED (1 TO 18), 18 BEING THE DEFAULT VALUE.
EGT HEXADECIMAL CODE TO BE ENTERED
SSM: 110 MEANS NORMAL OPERATION AND POSITIVE VALUE

PARAMETER LABEL

G9409341 - GAUT0T0 - FM31D6ACMSDO002

ACMS D/O (3)

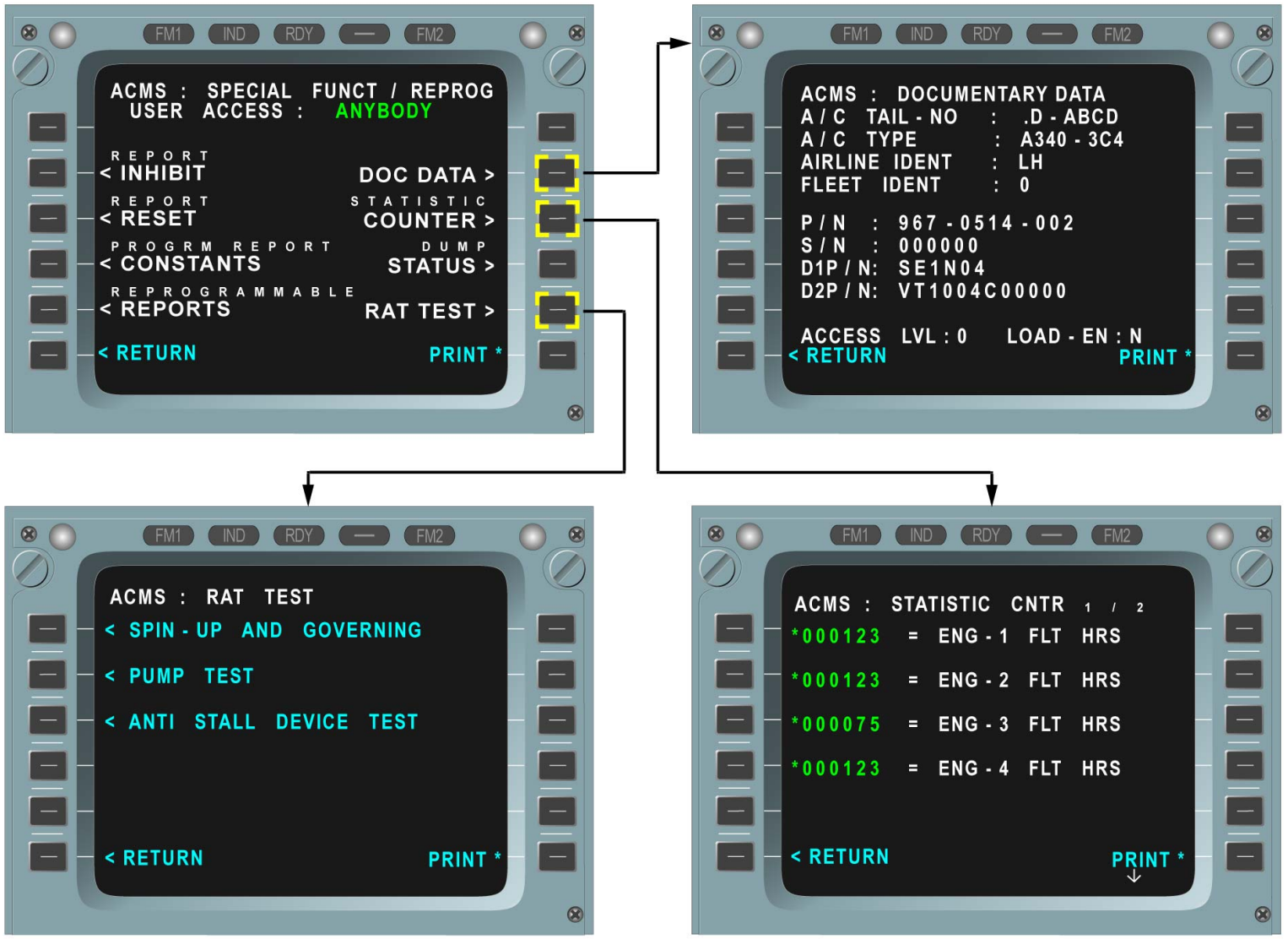
REPROGRAMMING

The ACMS is capable of reprogramming. The decision for reprogramming is done at the engineering level, and requires a password for access. The reprogramming of the ACMS is done, either by the GSE software tool for a full reprogramming or by using the MCDU for a very limited reprogramming. The MCDU reprogramming function enables report inhibition, report constants reprogramming, report logic and statistical counters reset. The REPORT INHIBIT key is used for the inhibition of all automatic triggers for a selected report. This inhibition will not disable the generation of the ACMS reports via the MCDU Manual Report Request function. The REPORT RESET key is used to reset the trigger logic and counters associated with specific ACMS reports. The PROGRAM REPORT CONSTANTS menu modifies constants within the ACMS reports. Constants are listed individually for each report. The DOCUMENTARY DATA menu provides some ACMS identification and essential configuration information. The STATISTIC COUNTERS menu allows the display and reprogramming of engine flight hours and engine cycles counters for each engine. The FDIMU/DMU part will reset engine hours and cycles for a particular engine position when the DMU recognizes a change in engine serial number. This menu lets the line maintenance personnel program the correct value for engine flight hours after an engine has been changed. In order to authorize the arming triggers associated with a RAT TEST report, a correct password has to be entered in the ACMS: SPECIAL FUNCtion/REPROGramming menu page. Note that the RAT test is not triggered by the FDIMU/DMU part.

G9409341 - GAUT0T0 - FM31D6ACMSDO002

REPROGRAMMING

G94093 41 - GAUT0T0 - FM31D6ACMSDO002



REPROGRAMMING

G9409341 - GAUT0T0 - FM31D6ACMSDO002

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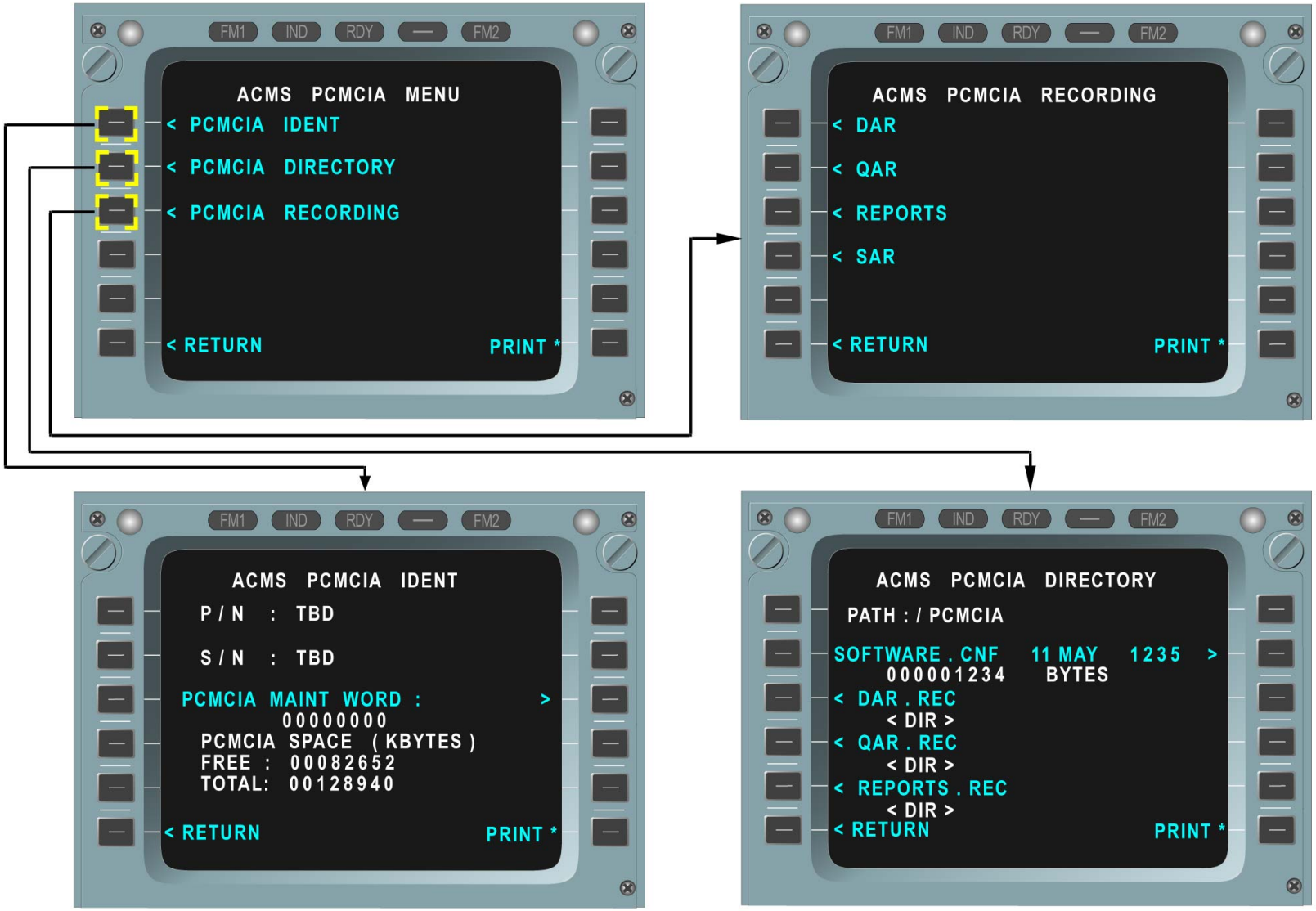
G9409341 - GAUT0T0 - FM31D6ACMSDO002

ACMS D/O (3)

PCMCIA

This function enables the PCMCIA board management and displays. It gives information related to the WDAR, QAR, ACMS REPORTS or Smart ACMS Recorder data recorded on the PCMCIA board by the DMU initially programmed from the GSE. If the PCMCIA is not programmed only WDAR data is recorded on PCMCIA board.
The ACMS PCMCIA IDENTIFICATION menu displays the part number, serial number, maintenance word status and the total free capacity of the PCMCIA. The ACMS PCMCIA DIRECTORY menu displays the structure of the directory and includes sub-directories and files. It is possible to switch to a sub-directory and to switch into a file. A file can be switched between hexadecimal and ASCII representations of the content. The ACMS PCMCIA RECORDING menu shall display the different recording partitions. It will display information such as record status, file name, and length of a record. Additionally, the total and the free capacity of the partition are displayed.

G9409341 - GAUT0T0 - FM31D6ACMSDO002


FM1
IND
RDY
FM2
ACMS PCMCIA MENU
< PCMCIA IDENT
< PCMCIA DIRECTORY
< PCMCIA RECORDING
< RETURN
PRINT *
ACMS PCMCIA RECORDING
< DAR
< QAR
< REPORTS
< SAR
< RETURN
PRINT *
ACMS PCMCIA IDENT
P / N : TBD
S / N : TBD
PCMCIA MAINT WORD : >
00000000
PCMCIA SPACE (KBYTES)
FREE : 00082652
TOTAL: 00128940
< RETURN
PRINT *
ACMS PCMCIA DIRECTORY
PATH : / PCMCIA
SOFTWARE . CNF 11 MAY 1235 >
000001234 BYTES
< DAR . REC
< DIR >
< QAR . REC
< DIR >
< REPORTS . REC
< DIR >
< RETURN
PRINT *

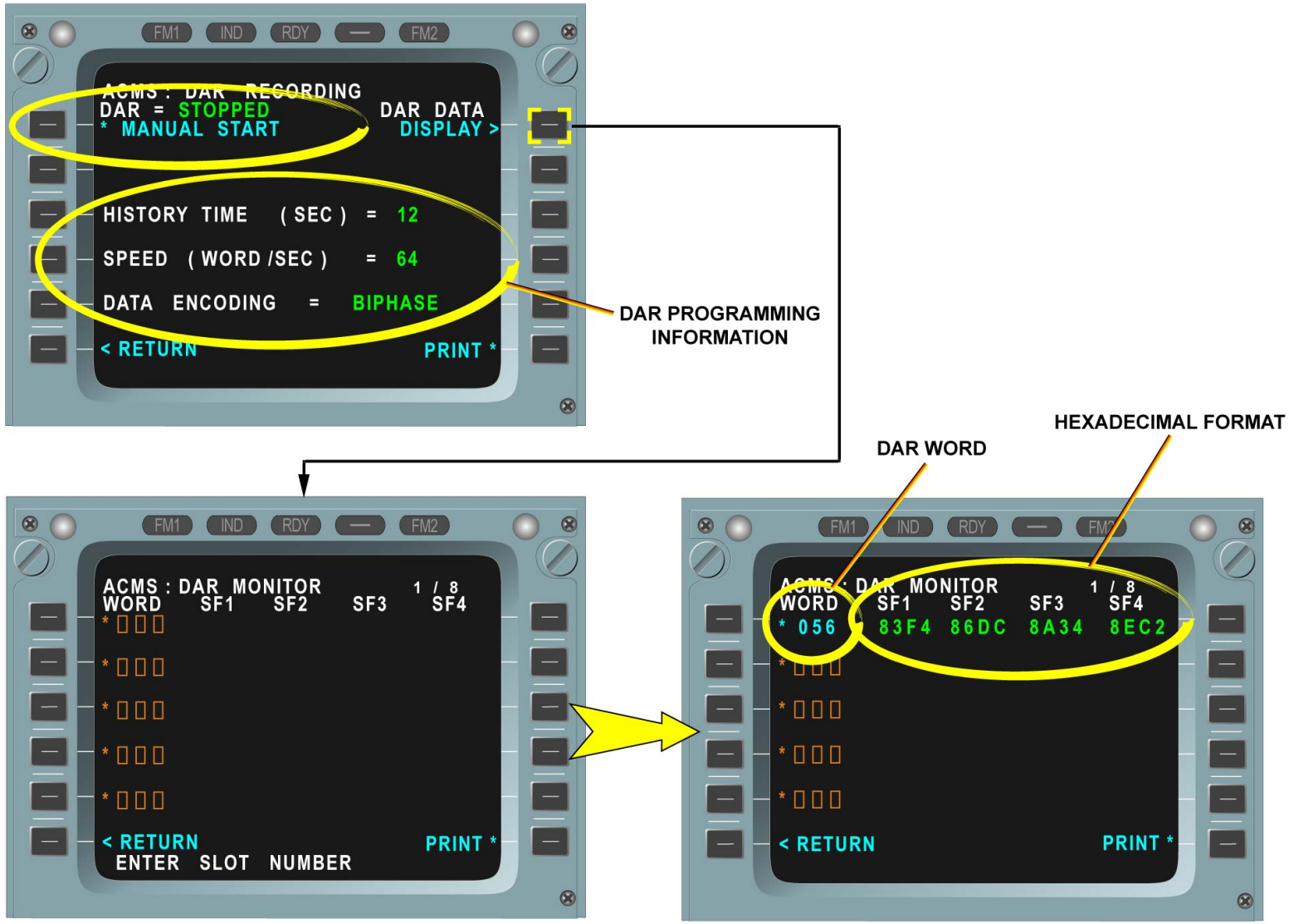
PCMCIA

ACMS D/O (3)

WDAR RECORDING

The ACMS DAR RECORDING menu supplies manual start and stop of the Wireless DAR recording and real time display of Wireless DAR data, when the Wireless DAR is installed. The Wireless DAR recording can be manually initiated via the MANUAL START function. By pressing this key, the STOPPED or RUNNING status is displayed. The menu page also gives information on the programming of the WDAR function such as, history time, recording speed and data encoding type. Up to 8 pages of 5 WDAR words are available. The data is displayed in hexadecimal format after the selection of desired word numbers.

G9409341 - GAUT0T0 - FM31D6ACMSDO002



WDAR RECORDING

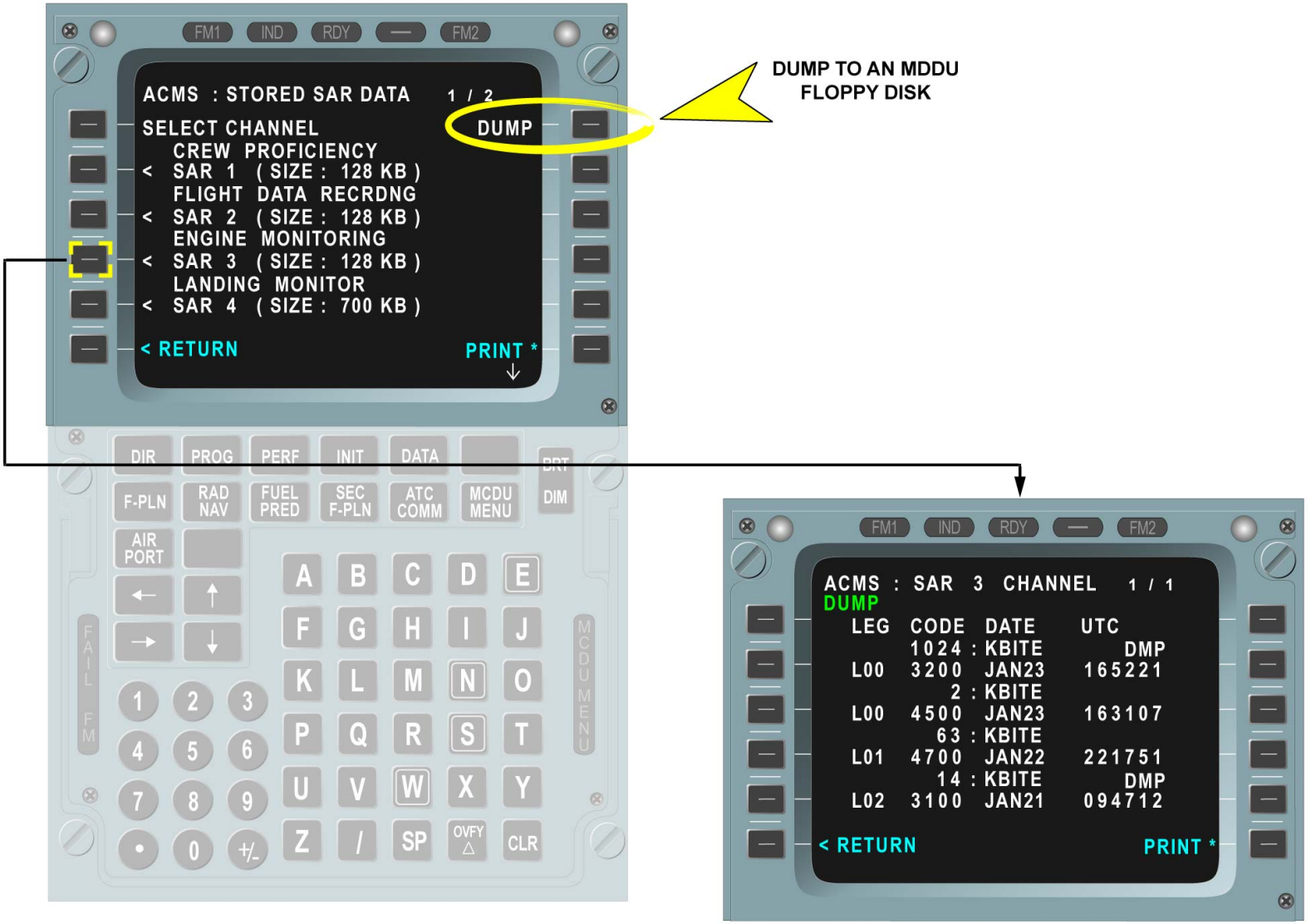
G9409341 - GAUT0T0 - FM31D6ACMSDO002

ACMS D/O (3)

STORED SAR DATA

The STORED SAR DATA menu gives a listing of all SAR recording channels with their related allocated memory size. In addition this menu is used for the dumping of a specific SAR selected channel files on a MDDU floppy disk. After selection of the requested SAR channel, the list of stored SAR files is called-up. This menu displays, for each file, the flight leg number with the associated trigger code, date and time when the file was created. This menu also provides the size of each SAR file. It is also possible to dump individual SAR files onto the MDDU.

G9409341 - GAUT0T0 - FM31D6ACMSDO002



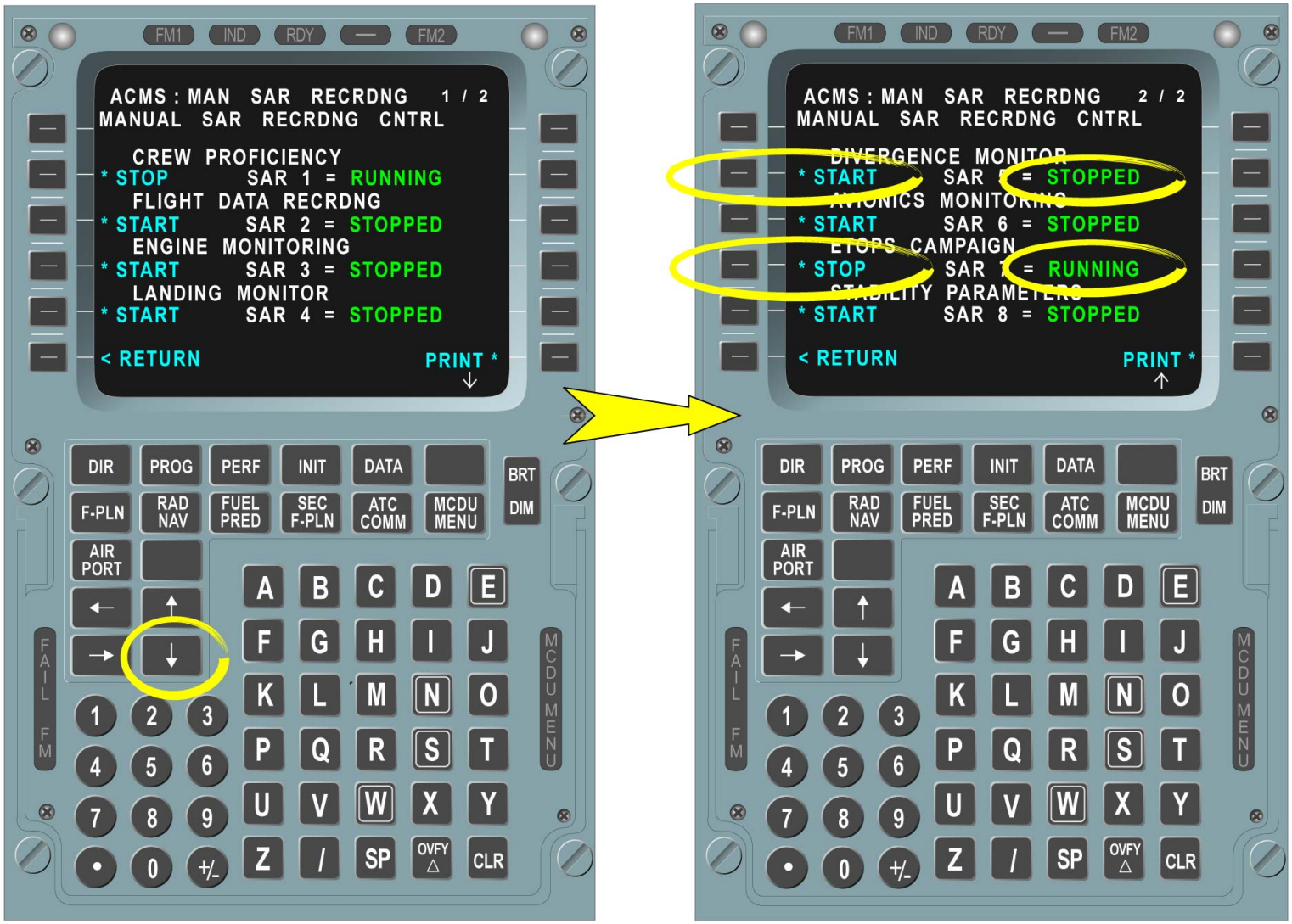
STORED SAR DATA

G9409341 - GAUT0T0 - FM31D6ACMSDO002

ACMS D/O (3)

MANUAL REQUEST SAR RECORDING

The Manual Request function supplies selective START/STOP control for each SAR recording channel. Each press of these keys toggles the "STOPPED/RUNNING" status of the appropriate channel.



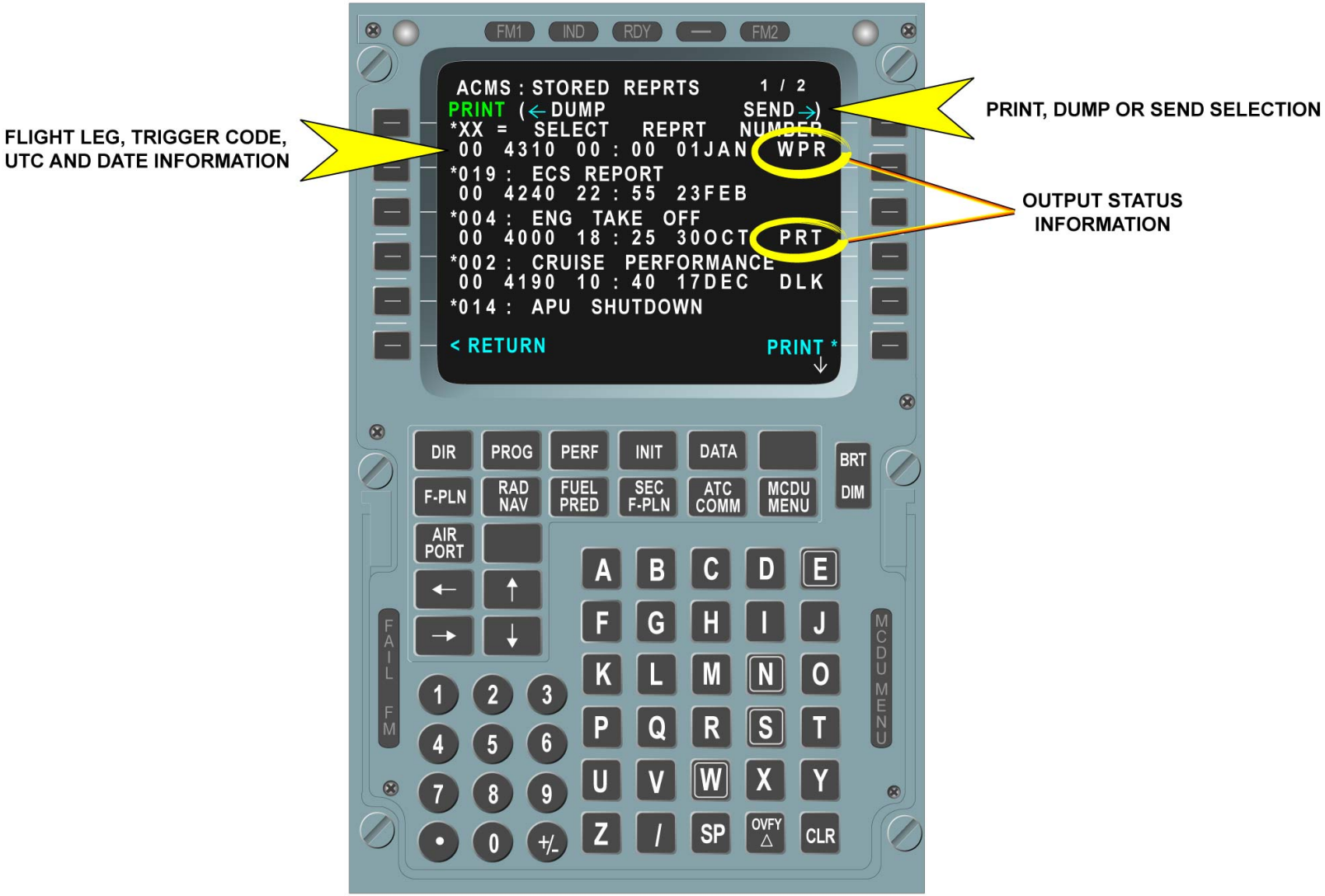
MANUAL REQUEST SAR RECORDING

ACMS D/O (3)

STORED REPORTS

The ACMS reports are built-up from alpha call-up codes. As long as a report is stored in the memory, the respective report title and report number is displayed. The selected report can be printed, sent to the Airline Operation Control (AOC) via the ATSU, or dumped onto a floppy disk thanks to the MDDU.
The list of stored reports includes the flight leg in which the report was generated, the related trigger code and date. Moreover, an output status is displayed and indicates:
- EOF Waiting for End-Of-Flight,
- WPR Waiting for Printing,
- PRT Printed,
- WDL Waiting for downlink,
- ACS In ACARS,
- DLK Down linked ,
- WDR Waiting for storage on WDAR,
- DAR Stored in WDAR.

G9409341 - GAUT0T0 - FM31D6ACMSDO002



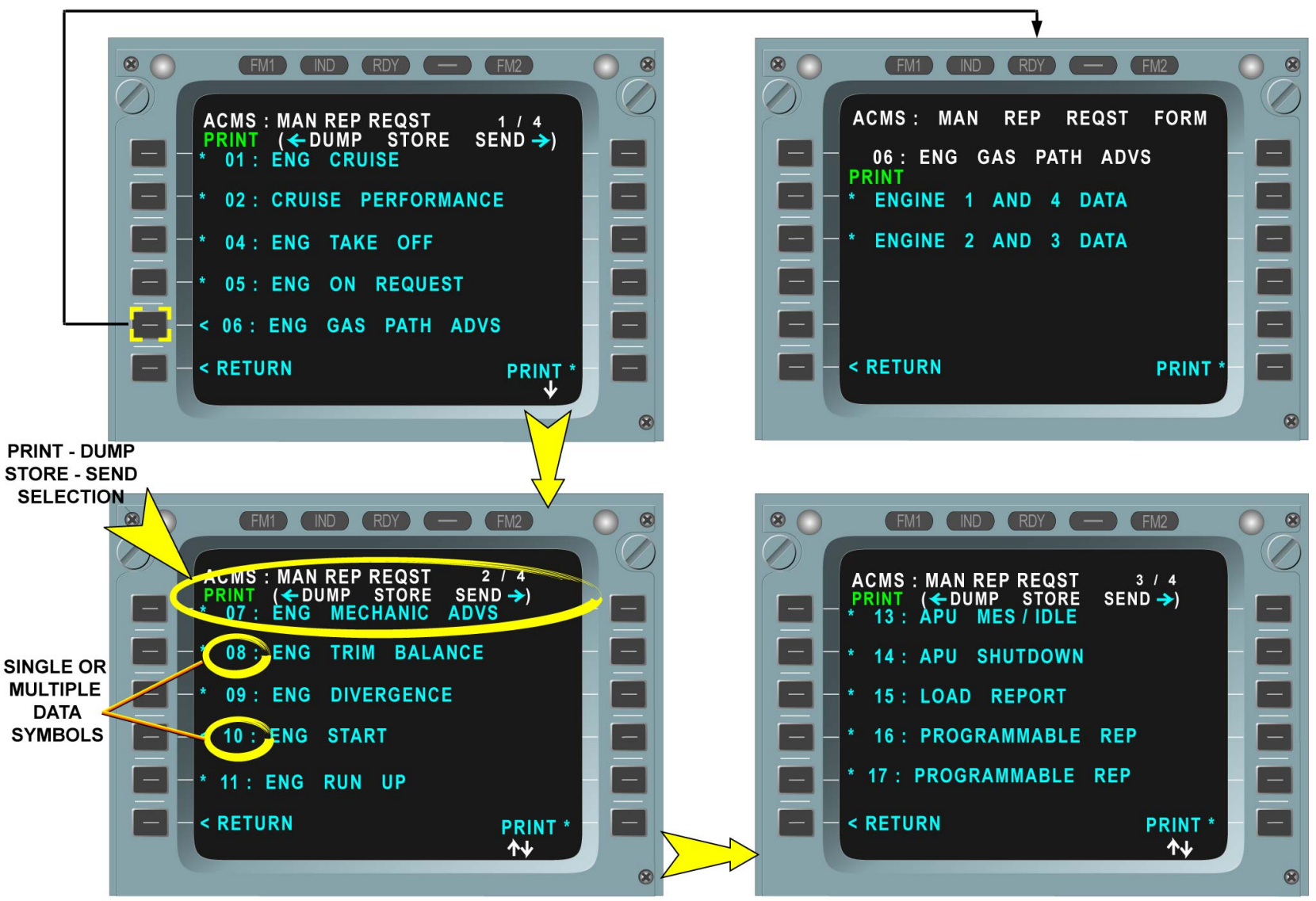
STORED REPORTS

ACMS D/O (3)

MANUAL REPORT REQUEST

The MANUAL REPORT REQUEST function is used, through report names with their associated number selection keys, for the immediate data collection and report generation. The selected report can be printed, sent to the Airline Operation Control via the ATSU, or dumped onto a floppy disk in the MDDU. An asterisk (*) is displayed for each report, if only a single data set or format has been defined for this report. If multiple formats or data sets are defined for a report, the symbol "less than" (<) is displayed instead of the asterisk. In this case, a MANUAL REPORT REQUEST FORMAT selects the display and the output of the content of the reports.

G9409341 - GAUT0T0 - FM31D6ACMSDO002


FM1 IND RDY FM2
ACMS : MAN REP REQST 1 / 4
PRINT (←DUMP STORE SEND →)
* 01 : ENG CRUISE
* 02 : CRUISE PERFORMANCE
* 04 : ENG TAKE OFF
* 05 : ENG ON REQUEST
< 06 : ENG GAS PATH ADVS
< RETURN
PRINT *
ACMS : MAN REP REQST FORM
06 : ENG GAS PATH ADVS
PRINT
* ENGINE 1 AND 4 DATA
* ENGINE 2 AND 3 DATA
< RETURN
PRINT *
PRINT - DUMP STORE - SEND SELECTION
ACMS : MAN REP REQST 2 / 4
PRINT (←DUMP STORE SEND →)
* 07 : ENG MECHANIC ADVS
* 08 : ENG TRIM BALANCE
* 09 : ENG DIVERGENCE
10 : ENG START
* 11 : ENG RUN UP
< RETURN
PRINT *
SINGLE OR MULTIPLE DATA SYMBOLS
ACMS : MAN REP REQST 3 / 4
PRINT (←DUMP STORE SEND →)
* 13 : APU MES / IDLE
* 14 : APU SHUTDOWN
* 15 : LOAD REPORT
* 16 : PROGRAMMABLE REP
* 17 : PROGRAMMABLE REP
< RETURN
PRINT *

MANUAL REPORT REQUEST

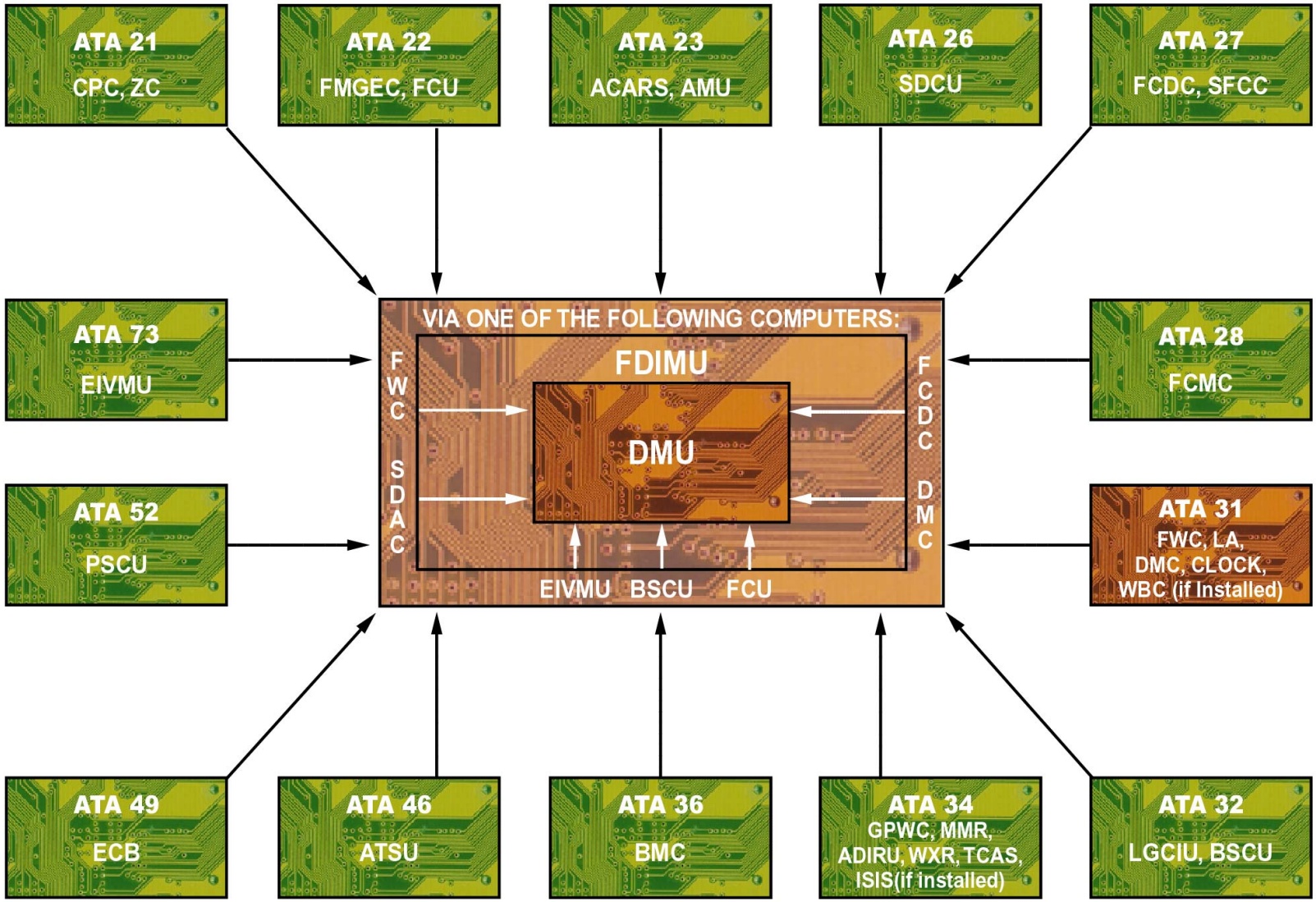
G9409341 - GAUT0T0 - FM31D6ACMSDO002

ACMS D/O (3)

DATA SOURCES

The parameters from 26 computers, receivers or transceivers can be transmitted to the DMU and recorded.

G9409341 - GAUT0T0 - FM31D6ACMSDO002



DATA SOURCES

G9409341 - GAUT0T0 - FM31D6ACMSDO002

ACMS REPORTS D/O (3)

GENERAL

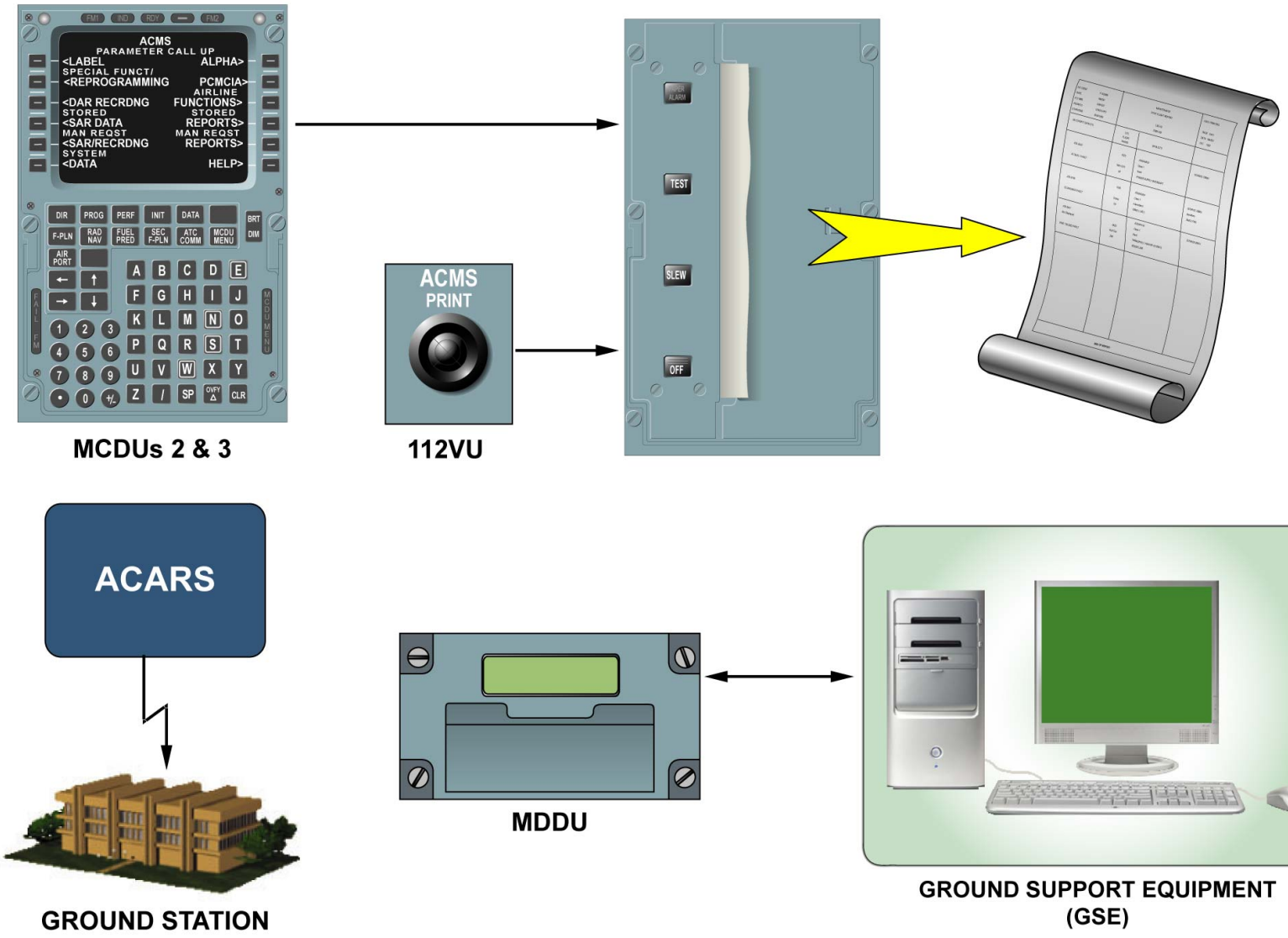
There are four categories of preprogrammed reports:
- engine monitoring,
- Auxiliary Power Unit (APU) monitoring,
- Environmental Control System (ECS),
- Ram Air Turbine (RAT).

And there are three programmable reports for trouble shooting assistance. These reports are triggered and generated when specific conditions are met.

All the reports can be printed from the MCDU. Some reports can be printed through the ACMS (Aircraft Condition Monitoring System) PRINT P/B, sent through Aircraft Communication Addressing and Reporting System (ACARS), or dumped on the Multipurpose Disk Drive Unit (MDDU). The parameters contained in the reports are among the 300 parameters provided with an Alpha Call-Up.

Some Report data items can be reconfigured through Ground Support Equipment (GSE), such as: Report limits, constants, parameter conversion factor, report time and destination, triggers, ACMS PRINT P/B functionality and report enable.

G9409341 - GAUT0T0 - FM31D7000000003


ACMS
PARAMETER CALL UP
<LABEL
SPECIAL FUNCT/
<REPROGRAMMING
<DAR RECRDNG
STORED
<SAR DATA
MAN REQST
<SAR/RECRDNG
SYSTEM
<DATA
ALPHA>
PCMCIA>
AIRLINE
FUNCTIONS>
STORED
REPORTS>
MAN REQST
REPORTS>
HELP>
MCDUs 2 & 3
ACMS
PRINT
112VU
TEST
SLEW
OFF
ACARS
GROUND STATION
MDDU
GROUND SUPPORT EQUIPMENT
(GSE)

GENERAL

ACMS REPORTS D/O (3)

PRINT REPORT STANDARD- HEADER DESCRIPTION

A standard header is printed on each report. It is composed of information about the report at the top, information about the flight, codes for report trigger conditions in the middle and general data at the bottom. Each data line starts with a two letter identifier. A checksum is printed in 2 hexadecimal characters at the end of each data line. The report information appears at the top of the report and it consists of 2 free programmable lines, which are available for airline specific messages, and another line that contains the report identification, title and number.

NOTE: Note: All reports shown on this module come from an A330 with GE engines.

A/C AND FLIGHT INFORMATION

The A/C and flight information on the report shows:
- A/C Identification, this is the tail number (ACID),
- date (DATE): year, month and day,
- Universal Time Coordinated (UTC): hours, minutes and seconds separated by points,
- city pair (FROM / TO),
- and Flight number (FLT).

TRIGGER CODES

The three left digits of the CODE are the logic code number that has triggered the report. The last digit shows the number of consecutive issued reports, or the letter "T" if the report was triggered via ACARS.
The trigger codes are the following:
- 1000: manual selection via MCDU,
- 2000: flight phase dependent manual selection via ACMS PRINT P/B if programmed,
- 3XXX: programmable start logic,
- 4000 to 7000: for these codes, refer to the table of the Aircraft Maintenance Manual (AMM) on ATA chapter 31, subchapter 36,
- reports are triggered by a combination of logic conditions.

When a report is generated by ACARS a request is sent. This request contains an appropriate ACARS Tieback code (TIEBCK) with 6 characters.

GENERAL DATA

The general data that appears on the first line (C1) is:
- Report Count (CNT) ; the three digits are the numbers of the reports that were previously initiated, either automatically or by the ACMS PRINT P/B,

The general data that appear on the second line (C2) are:
- Previous Report (PRV) ; the three digits are the report type number of the previously generated report,
- Flight Phase (PH),
- the Data Management Unit (DMU) software is identified with three part numbers: the System, the Version and the Customer software part number,
- Temporary Modifications (MOD) ; this is a three digit counter which determines the expiration time of temporary modifications of constants,
- Auto Pilot (AP) 1 or 2 status (i.e.: 012 means altitude hold mode active).

The general data that appear on the third line (C3) are:
- Total Air Temperature (TAT) ; in case of negative value it is indicated by "N" and positive value by "0" on the first character,
- Standard Altitude (ALT) ; negative value is indicated by "N" on the first character. Otherwise the first position is used for the value,
- Mach Number (MN),
- each digit of SYS part indicates the Air Data/Inertial Reference Unit (ADIRU) number of the respective TAT, ALT and MN value,
- BLEED STATUS data is the discrete coded information and numerical values. Each number indicates the position of the

G9409341 - GAUT0T0 - FM31D7000000003

corresponding valve (open/closed) except the first and the last which indicate the pack flow value,
- APU digit indicates the bleed valve position (1 to indicate that the valve is opened, and 0 to indicate that is closed).

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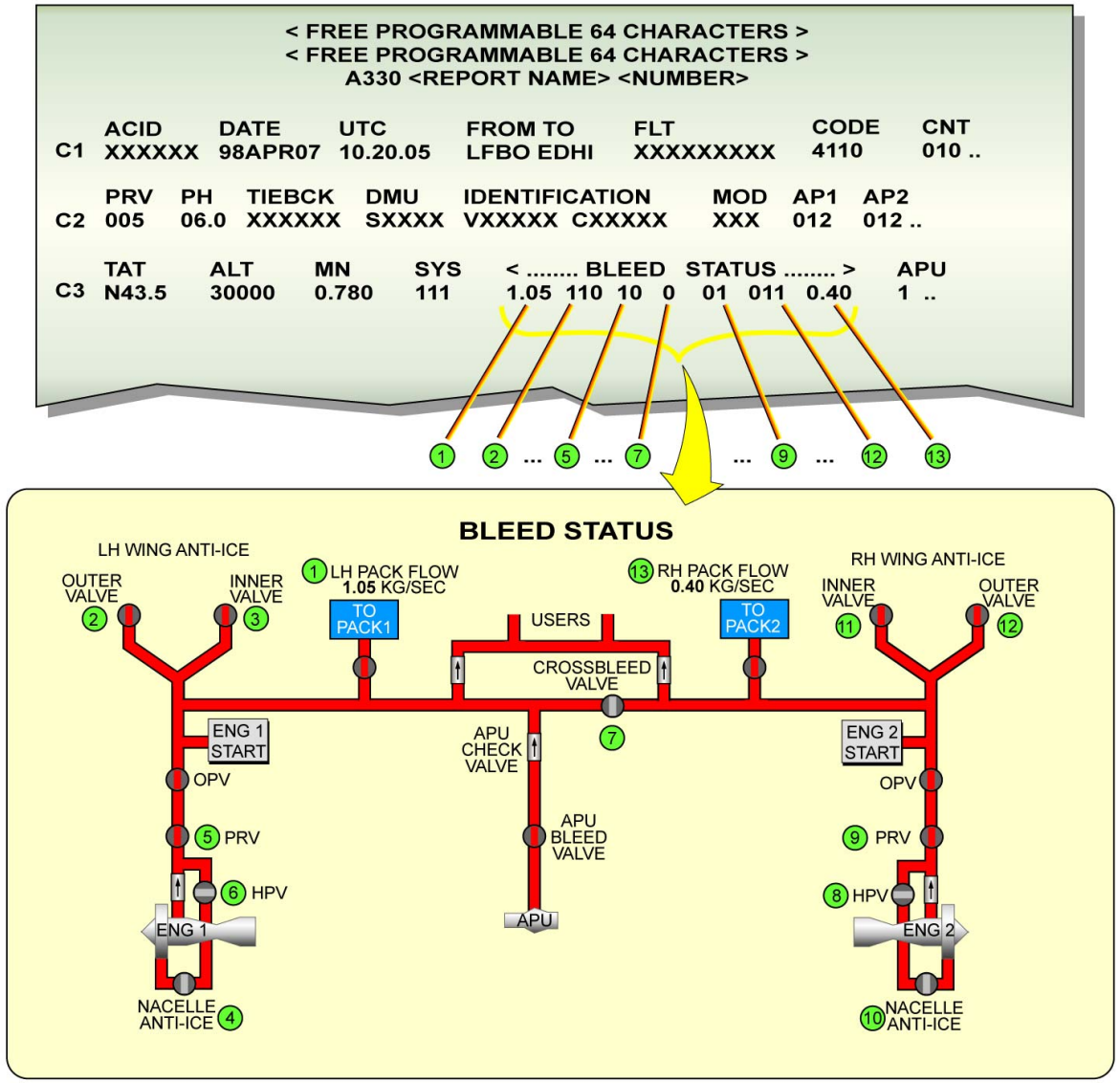

PRINT REPORT STANDARD- HEADER DESCRIPTION - A/C AND FLIGHT INFORMATION ... GENERAL DATA

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G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

ENGINE CRUISE REPORT <01>

The Engine Cruise Report is generated when the A/C is in stable condition. It records operating conditions of the engines. All data is an average with the exception of:
- serial number,
- A/C Flight Hours (FH) with dedicated engine, running time, cycles,
- source status (status of Full Authority Digital Engine Control (FADEC) sensors),
- engine control word, engine vibration status,
- oil consumption, oil system chip detection.

CRUISE PERFORMANCE REPORT <02>

The Cruise Performance Report is similar to report <01> except that data is sampled for longer periods and more information is provided about the A/C and flight controls.

G9409341 - GAUT0T0 - FM31D7000000003

< FREE PROGRAMMABLE 64 CHARACTERS >
< FREE PROGRAMMABLE 64 CHARACTERS >
A330 CRUISE PERFORMANCE REPORT < 02 >

	ACID	DATE	UTC	FROM TO	FLT	CODE	CNT
C1	XXXXXX	98APR07	10.20.05	LFBO EDHI	XXXXXXXXX	4110	010 ..

	PRV	PH	TIEBCK	DMU	IDENTIFICATION	MOD	AP1	AP2
C2	005	06.0	XXXXXX	SXXXX	VXXXXX CXXXXX	XXX	012	012 ..

	TAT	ALT	MN	SYS	< ..... BLEED STATUS ..... >	APU
C3	N43.5	30000	0.780	111	1.05 110 10 0 01 011 0.40	1 ..

	ESN	EHRS	ERT	ECYC	SOURCE STATUS	ECW1	EVM	NM	QA/QE
C5	731.205	00134	00216	00079	1111H1111111111	00010	26064	6	05 ..
C6	731.232	00317	00431	00223	5HH1H111111111S	00010	26064	6	05 ..

	N1	N1C	N1A	N2	EGT	P49	FF	PS14	P25
N1	086.20	086.6	086.20	090.8	0611	14.12	1351	17.42	34.12 ..
N2	086.21	086.4	086.21	090.7	0613	16.23	1362	19.20	35.78 ..

	T25	PS3	T3	T5	VSV	VBV	HPT	LPT	GLE	PD	TN
S1	67.42	223.3	560.3	600.4	25.3	30.4	040	060	030.4	20	210 ..
S2	67.09	224.6	550.3	610.2	26.2	31.2	041	062	032.8	21	217 ..

	OIQH	OIP	OIT	OC	VF	VC	VH	VL	PHF	PHT	BBF	BBT
T1	12.34	047	092.9	0	21.5	4.35	5.12	32.8	235	067	5.76	4.13 ..
T2	11.89	046	091.4	0	22.6	3.68	5.78	31.3	229	065	4.99	4.02 ..

	ELEV	AOA	DA	CIVU	CFPG	LATP
X1	N04.2	005.3	056.4	N001	1.0065	N45.21 ..
X2	N04.5	005.1	056.2	N001	1.0039	N45.60 ..

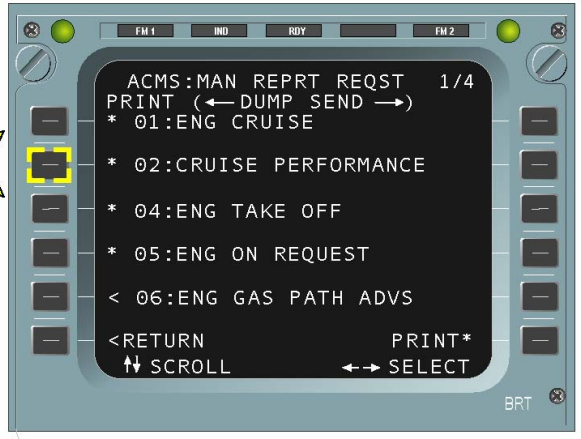
	RUDD	RUDT	STAB	ROLL	YAW	PTCH	DRM	GM	CG
X3	000.6	002.5	002.1	N00.7	N00.2	001.5	000100	235000	24.5 ..

	RSP1	RSP2	RSP3	RSP4	RSP5	RSP6	FLAP	SLAT	THDG
X4	000.3	000.2	000.2	000.1	000.3	000.2	000.4	020.0	0035.6 ..
X5	000.2	000.1	000.2	000.3	000.4	000.2	000.2	020.4	0035.2 ..

	AILL	AILR	WS	WD	AFT	AFD
X6	N07.1	N08.3	026	0237	045.3	0.025 ..
X7	N07.3	N08.0	027	0238	045.2	0.028 ..

THIS PRINT IS PROVIDED AS EXAMPLE

Engine 1 data line
Engine 2 data line



MCDU

A/C and flight controls information

ENGINE CRUISE REPORT <01> & CRUISE PERFORMANCE REPORT <02>

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ACMS REPORTS D/O (3)

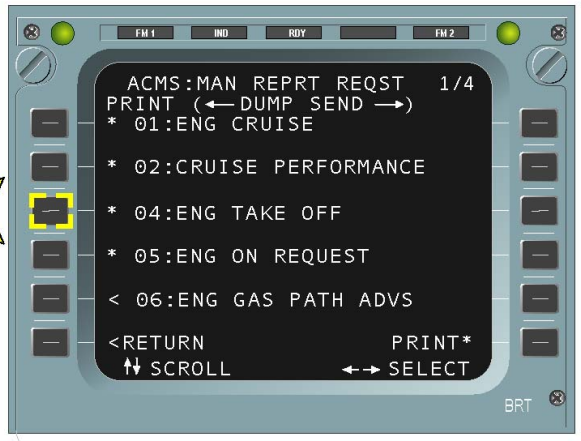
ENGINE TAKEOFF REPORT <04>

The Engine Take Off Report is generated a few seconds after take-off. The number of intervals between each Engine Take-off Report generation is programmable. It collects parameters of A/C and engine during the take-off flight phase. "T/O DELTA N1 SUMMARY" is the difference between N1 MAX and N1 from the engine with the maximum value of N1. This report is used to check the trend and the stress of the engines at take-off.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                      A330  ENGINE TAKE OFF REPORT  < 04 >

     ACID      DATE      UTC       FROM TO      FLT          CODE     CNT
C1   XXXXXX    98APR07   10.20.05  LFBO EDHI    XXXXXXXXX    4110     010 ..

     PRV   PH    TIEBCK   DMU     IDENTIFICATION       MOD   AP1   AP2
C2   005   06.0  XXXXXX   SXXXX   VXXXXX CXXXXX        XXX   012   012 ..

     TAT      ALT      MN       SYS     < ..... BLEED  STATUS ..... >     APU
C3   N43.5    30000    0.780    111     1.05 110 10  0  01  011  0.40      1 ..

     ESN      EHRS     ERT      ECYC    SOURCE STATUS      ECW1   ECWZ   EVM    NM
C5   731205   00134    00216    00079   11111111111111     00000  0040A  26064  8 ..
C6   731232   00317    00431    00223   1111H111111111S    00000  0040A  36064  4 ..


     T / O  DELTA  N1  SUMMARY

N1   03  02  00  00  00  01  00  00 ..
N2   03  02  00  00  00  01  00  00 ..

     N1       N1C      N1A      N1MX     NZ     P49     EGT    FF     P0     T12
S1   086.20   086.6    086.20   090.3    083.1  14.12   0612   1350   15.3   048.9 ..
S2   086.21   086.6    086.21   090.8    082.8  16.23   0612   1362   19.2   016.2 ..

     P25      T25      PS3      T3       T5     VSV     VBV    HPT    LPT    GLE
T1   34.10    67.4     223.3    560.3    600.4  25.3    30.4   040    060    030.4 ..
T2   35.78    67.0     224.8    550.3    610.2  26.2    31.2   041    062    032.8 ..

     PD   TN   OIP   OIT     VF    VC    VH    VL    PHF  PHT  BBF   BBT
V1   20   210  047   092.9   21.5  3.35  5.12  32.8  235  067  5.76  4.13 ..
V2   21   217  046   091.4   22.6  3.68  5.78  31.3  229  065  4.99  4.02 ..
```

THIS PRINT IS PROVIDED AS EXAMPLE



MCDU

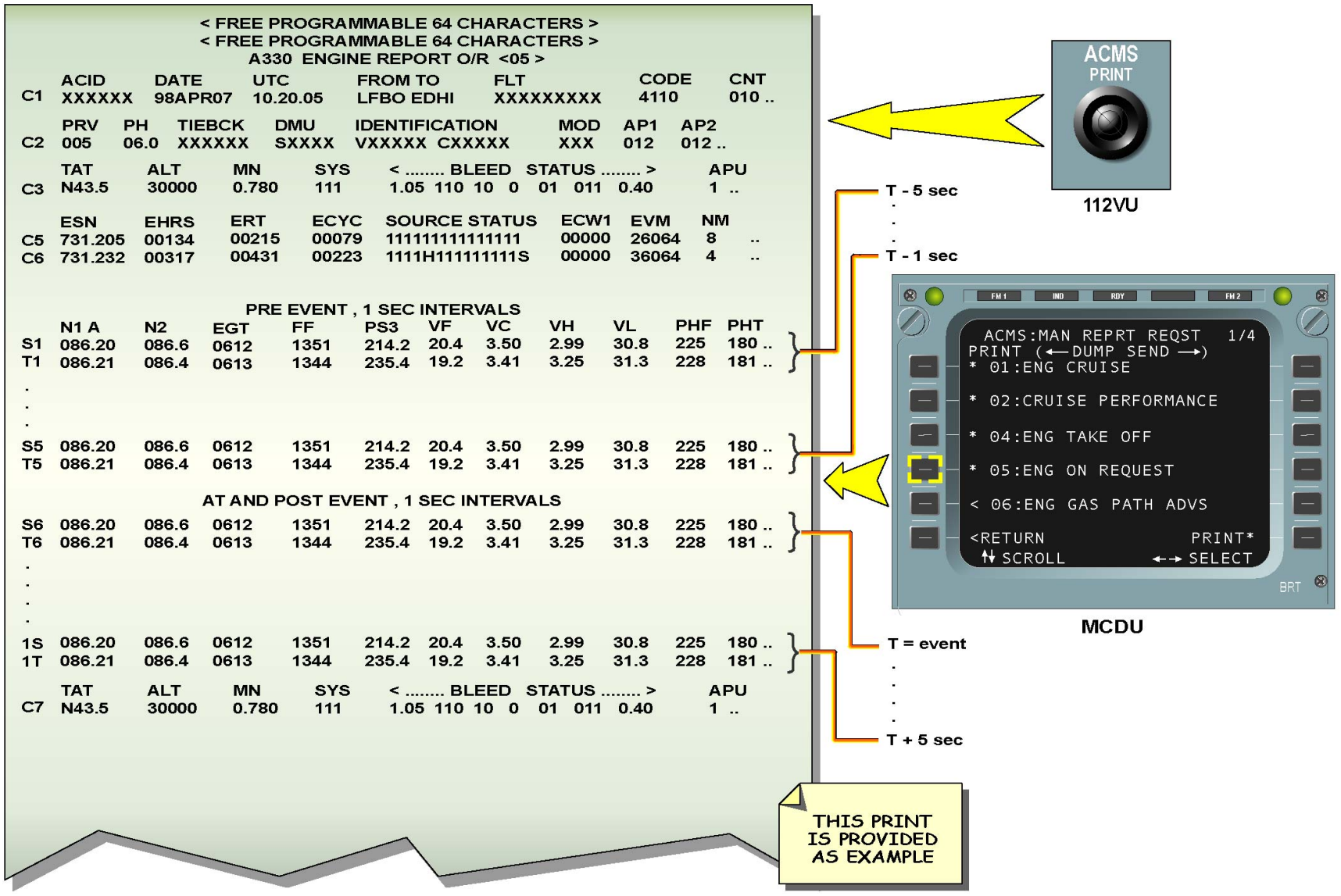
ENGINE TAKEOFF REPORT <04>

ACMS REPORTS D/O (3)

ENGINE REPORT ON REQUEST <05>

The Engine Report On Request provides a snapshot of the engine parameters. This report can be generated by manual request thanks the ACMS PRINT P/B, or through the MCDU menu selection, or by the programmable triggers. The parameters recorded are taken in one second intervals from five seconds before the request to five seconds after.

G9409341 - GAUT0T0 - FM31D7000000003



ENGINE REPORT ON REQUEST <05>

ACMS REPORTS D/O (3)

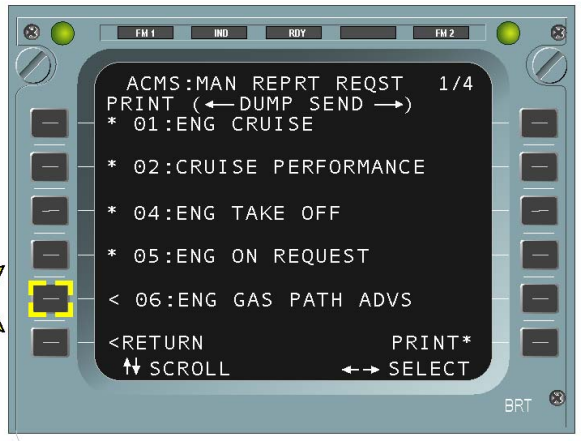
ENGINE GAS PATH ADVISORY REPORT <06>

The Engine Gas Path Advisory Report is generated when there is an excess of one of the primary engine parameters (EGT/N1/N2) or either a stall, shutdown or flame out condition exists on one engine. Four sets of parameters are recorded at one second intervals before the event and five sets are recorded at one second intervals after the event.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                A330  ENGINE GAS PATH ADVISORY REPORT  < 06 >
     ACID       DATE       UTC          FROM TO        FLT              CODE      CNT
C1   XXXXXX     98APR07    10.20.05     LFBO EDHI      XXXXXXXXX        4110      010 ..

     PRV   PH    TIEBCK    DMU      IDENTIFICATION          MOD   AP1   AP2
C2   005   06.0  XXXXXX    SXXXX    VXXXXX  CXXXXX          XXX   012   012 ..

     TAT       ALT       MN        SYS      < ..... BLEED  STATUS ..... >        APU
C3   N43.5     30000     0.780     111      1.05  110  10   0   01   011  0.40    1 ..

     ESN       EHRS      ERT       ECYC     SOURCE STATUS       ECM1    EVN3    NM
C5   731205    00134     00215     00079    111111111111111     00000   01040   8 ..
C6   731232    00317     00431     00223    1111H111111111S     00000   01040   4 ..
     LIMIT EXCEEDANCE SUMMARY          REASON : EGT
      E   MAX   LIM  TOL  TTP   N2    N1P   N2P    EGTM
N1   1  187.00 019.05  060  030  067.9  078.6  089.0  0612 ..
                          PRE EVENT , 1 SEC INTERVALS
     N1A       N1C       N2        EGT      FF       P25    T25     PS3     T3
S1   086.20    086.6     090.8     0612     1351     34.12  67.42   223.3   560.3 ..
T1   086.21    086.4     089.7     0613     1350     33.83  66.35   224.5   561.2 ..
     TAT       ALT       MN        SYS      < ..... BLEED  STATUS ..... >        APU
1C   N43.5     30000     0.780     111      1.05  110  10   0   01   011  0.40    1 ..
S2   086.20    086.6     090.8     0612     1351     34.12  67.42   223.3   560.3 ..
T2   086.21    086.4     089.7     0613     1350     33.83  66.35   224.5   561.2 ..
2C   N43.5     30000     0.780     111      1.05  110  10   0   01   011  0.40    1 ..
.
S4   086.20    086.6     090.8     0612     1351     34.12  67.42   223.3   560.3 ..
T4   086.21    086.4     089.7     0613     1350     33.83  66.35   224.5   561.2 ..
4C   N43.5     30000     0.780     111      1.05  110  10   0   01   011  0.40    1 ..
                          AT AND POST EVENT , 1 SEC INTERVALS
S5   086.20    086.6     090.8     0612     1351     34.12  67.42   223.3   560.3 ..
T5   086.21    086.4     089.7     0613     1350     33.83  66.35   224.5   561.2 ..
5C   N43.5     30000     0.780     111      1.05  110  10   0   01   011  0.40    1 ..
  .
  .
  .
S9   086.20    086.6     090.8     0612     1351     34.12  67.42   223.3   560.3 ..
T9   086.21    086.4     089.7     0613     1350     33.83  66.35   224.5   561.2 ..
9C   N43.5     30000     0.780     111      1.05  110  10   0   01   011  0.40    1 ..
```

THIS PRINT IS PROVIDED AS EXAMPLE



MCDU

ENGINE GAS PATH ADVISORY REPORT <06>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

ENGINE MECHANICAL ADVISORY REPORT <07>

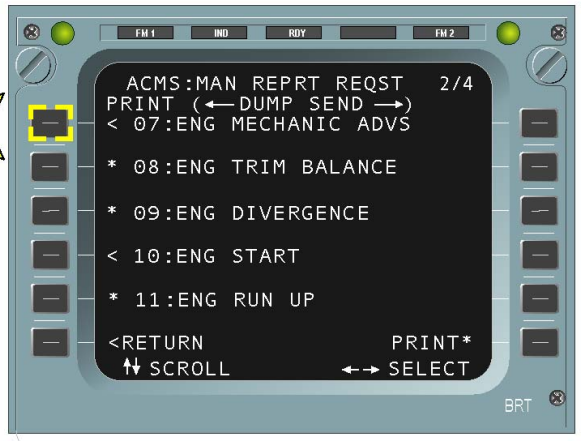
The Engine Mechanical Advisory report is generated when there is an excess of one of the following engine parameters:
- oil temperature,
- oil pressure,
- nacelle temperature,
- N1 and N2 vibration,
- and the system chip detection.

Five parameter sets are recorded at one second intervals before the event and 9 parameter sets at one second intervals after the event. There is one report for each engine.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                A330  ENGINE MECHANICAL ADVISORY REPORT  < 07 >

     ACID      DATE      UTC       FROM TO      FLT          CODE     CNT
C1   XXXXXX    98APR07   10.20.05  LFBO EDHI    XXXXXXXXX    4110     010 ..

     PRV   PH    TIEBCK   DMU     IDENTIFICATION       MOD   AP1   AP2
C2   005   06.0  XXXXXX   SXXXX   VXXXXX CXXXXX        XXX   012   012 ..

     TAT      ALT      MN       SYS      < ..... BLEED  STATUS ..... >      APU
C3   N43.5    30000    0.780    111      1.05 110 10  0   01  011  0.40     1 ..

     ESN      EHRS     ERT      ECYC     SOURCE STATUS      ECM1   EVN3   NM
C4   731205   00134    00215    00079    111111111111111    00000  01040  8 ..
     LIMIT EXCEEDANCE SUMMARY   REASON : VIB N1
     E   MAX    LIM    TOL  TTP  N1     N2     EVM    OIT   OIQ  OF  OC
N1   1   187.00 019.06 060  030  067.9  070.4  26064  200.2 073  01  0 ..
                        PRE EVENT , 1 SEC INTERVALS
     N1      N2      VF    VC    VH    VL    PHF  PHT  BBF   BBT   OIP
S1   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
S2   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
S3   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
S4   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
S5   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
                      AT AND POST EVENT , 1 SEC INTERVALS
S6   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
S7   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
S8   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
S9   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
S0   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
1S   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
2S   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
3S   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
4S   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
5S   086.20  086.6   30.4  2.72  3.48  29.3  223  235  5.64  4.56  340 ..
```

THIS PRINT IS PROVIDED AS EXAMPLE



MCDU

ENGINE MECHANICAL ADVISORY REPORT <07>

G9409341 - GAUT0T0 - FM31D7000000003

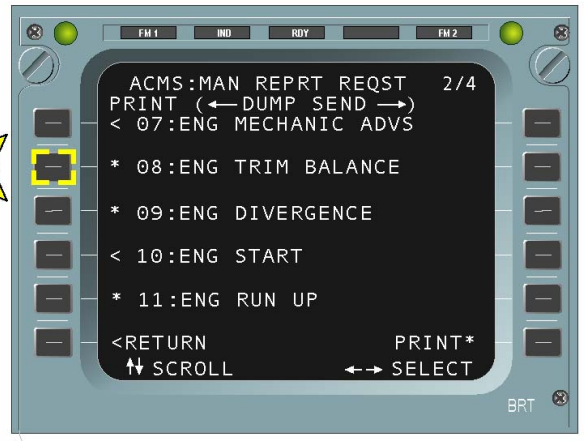
ACMS REPORTS D/O (3)

ENGINE TRIM BALANCE ADVISORY REPORT <08>

The Engine Balance Advisory Report will monitor for stable engine conditions during each of five different flight phases. The data collection will be an averaged collection over the stable engine conditions for these flight phases. Each flight phase average data set contains engine spool speeds, engine vibrations and vibration phase angle for both the turbine and the fan for all engine positions. The information contained on this report can be used to balance the engine spools.

G9409341 - GAUT0T0 - FM31D7000000003

```
                < FREE PROGRAMMABLE 64 CHARACTERS >
                < FREE PROGRAMMABLE 64 CHARACTERS >
              A330  ENGINE TRIM BALANCE ADV REPORT  < 08 >
     ACID       DATE       UTC        FROM TO      FLT          CODE      CNT
C1   XXXXXX     98APR07    10.20.05   LFBO EDHI    XXXXXXXXX    4110      010 ..

     PRV   PH    TIEBCK    DMU      IDENTIFICATION        MOD   AP1   AP2
C2   005   06.0  XXXXXX    SXXXX    VXXXXX  CXXXXX        XXX   012   012 ..

     TAT       ALT       MN        SYS      < ..... BLEED  STATUS ..... >      APU
C3   N43.5     30000     0.780     111        1.05  110  10   0   01   011  0.40    1 ..

     ESN       EHRS      ERT       ECYC     SOURCE STATUS      ECW1   NM
C5   731.205   00134     00215     00079    111111111111111    00000  8    ..
C6   731.232   00317     00431     00223    1111H111111111S    00000  4    ..

     UTC       PH   ALT    MN
E1   10.20.40  6.0  28349  0.68

     VF   VC   VH   VL   PHF  PHT  BBF   BBT   N1A      N2     EVM
S1   21.5 3.35 5.12 32.8 235  067  5.76  4.13  086.20   083.1  26064 ..
T1   22.6 3.68 5.78 31.3 239  065  4.99  4.02  086.21   082.8  36064 ..
.
.
.
.
E5   10.20.40  6.0  28349  0.68
S5   21.5 3.35 5.12 32.8 235  067  5.76  4.13  086.20   083.1  26064 ..
T5   22.6 3.68 5.78 31.3 229  065  4.99  4.02  086.21   082.8  36064 ..
```



MCDU

First data set

Fifth data set

THIS PRINT IS PROVIDED AS EXAMPLE

ENGINE TRIM BALANCE ADVISORY REPORT <08>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

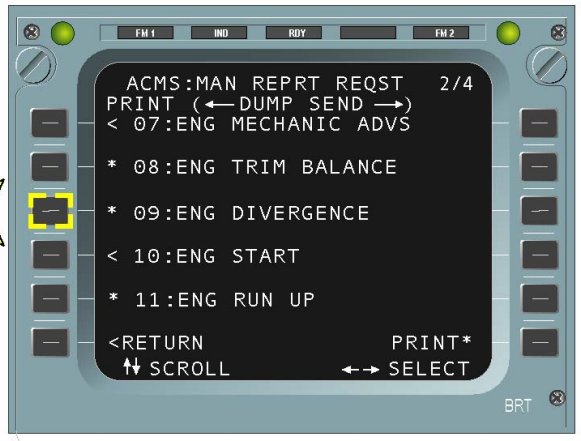
ENGINE DIVERGENCE REPORT <09>

The Engine Divergence Report is generated when the Exhaust Gas Temperature divergence or Nacelle Temperature divergence threshold values are exceeded on at least one engine. Three parameter sets are recorded at two seconds intervals before the event and three parameter sets at two seconds intervals after the event.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    A330  ENGINE DIVERGENCE REPORT  < 09 >
     ACID       DATE       UTC        FROM TO       FLT            CODE      CNT
C1   XXXXXX     98APR07    10.20.05   LFBO EDHI     XXXXXXXXX      4110      010 ..

     PRV   PH   TIEBCK    DMU      IDENTIFICATION        MOD   AP1   AP2
C2   005   06.0 XXXXXX    SXXXX    VXXXXX CXXXXX         XXX   012   012 ..

     TAT       ALT       MN        SYS      < ..... BLEED  STATUS ..... >      APU
C3   N43.5     30000     0.780     111        1.05 110 10  0   01  011  0.40     1 ..

     ESN       EHRS      ERT       ECYC     SOURCE STATUS      ECW1   NM
C5   731205    00134     00216     00079    111111111111111    00000  8    ..
C6   731232    00317     00431     00223    1111H111111111S    00000  4    ..

     DIVERGENCE SUMMARY                    REASON :  TN
     E  EDV5   ERF5   NDV5   NRF5   EDV6   ERF6   NDV6   NRF6   K
N1   1  XXXX   XXXX   XXX.X  XXX.X  XXXX   XXXX   XXX.X  XXX.X  10 ..
                        PRE EVENT , 2 SEC INTERVALS
     N1       N1C    N1A      N2     EQT    P49      FF     TN      VSV    VBV
S1   086.20   086.6  086.20   090.8  0612   14.12    1351   210.0   25.3   30.4 ..
T1   086.21   086.4  086.21   089.7  0613   16.23    1350   212.4   25.1   30.2 ..
.
.
S3   086.20   086.6  086.20   090.8  0612   14.12    1351   210.0   25.3   30.4 ..
T3   086.21   086.4  086.21   089.7  0613   16.23    1350   212.4   25.1   30.2 ..
                      AT AND POST EVENT , 2 SEC INTERVALS
S4   086.20   086.6  086.20   090.8  0612   14.12    1351   210.0   25.3   30.4 ..
T4   086.21   086.4  086.21   089.7  0613   16.23    1350   212.4   25.1   30.2 ..
.
.
S7   086.20   086.6  086.20   090.8  0612   14.12    1351   210.0   25.3   30.4 ..
T7   086.21   086.4  086.21   089.7  0613   16.23    1350   212.4   25.1   30.2 ..
```

THIS PRINT IS PROVIDED AS EXAMPLE



MCDU

ENGINE DIVERGENCE REPORT <09>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

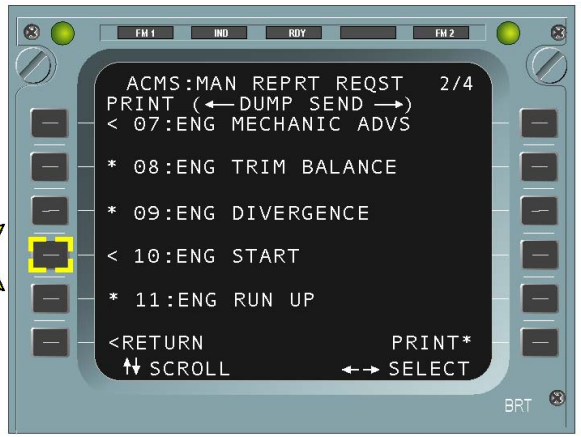
ENGINE START REPORT <10>

The Engine Start Report is generated when an abnormal start has been detected during main engine start and every 25 engine starts.
There is one report for each engine. Three parameter sets are recorded at six seconds intervals before the event and three parameter sets are recorded at two seconds intervals after the event.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                       A330  ENGINE START REPORT  < 10 >

     ACID       DATE       UTC          FROM TO        FLT              CODE      CNT
C1   XXXXXX     98APR07    10.20.05     LFBO EDHI      XXXXXXXXX        4110      010 ..

     PRV    PH     TIEBCK     DMU      IDENTIFICATION          MOD    AP1    AP2
C2   005    06.0   XXXXXX     SXXXX    VXXXXX  CXXXXX          XXX    012    012 ..

     TAT        ALT        MN         SYS      < ..... BLEED  STATUS ..... >        APU
C3   N43.5      30000      0.780      111        1.05  110  10   0   01   011   0.40    1 ..

     ESN        EHRS       ERT        ECYC     SOURCE STATUS      NM
C5   731.205    00134      00215      00079    111111111111111     8     ..
C6   731.232    00317      00431      00223    1111H111111111S     4     ..
     LIMIT EXCEEDANCE SUMMARY       REASON:  LOW AIR PRESSURE
       E  MAX     T0S    TTP    TTA   TTF    FF      PD    S
N1  1  167.00    021    030    015   022   0123    25    10  ..
                          PRE EVENT , 6 SEC INTERVALS
        N1       N1A      N2     EGT    P49     FF      FMV  T25     PD  PS3
S1    086.20   086.20   090.8  0612   14.12   1351    040  036.7   22  231.3 ..
        T3       VSV      VBV    T5     OIP     IOT     ECW4        ECN5
T1    500.4    25.3     30.4   357.8  125     057.8   00045       0054A ..
S2    086.20   086.20   090.8  0612   14.12   1351    040  036.7   22  231.3 ..
T2    500.4    25.3     30.4   357.8  125     057.8   00045       0054A ..
S3    086.20   086.20   090.8  0612   14.12   1351    040  036.7   22  231.3 ..
T3    500.4    25.3     30.4   357.8  125     057.8   00045       0054A ..
                          AT AND POST EVENT , 2 SEC INTERVALS
S4    086.20   086.20   090.8  0612   14.12   1351    040  036.7   22  231.3 ..
T4    500.4    25.3     30.4   357.8  125     057.8   00045       0054A ..
S5    086.20   086.20   090.8  0612   14.12   1351    040  036.7   22  231.3 ..
T5    500.4    25.3     30.4   357.8  125     057.8   00045       0054A ..
S6    086.20   086.20   090.8  0612   14.12   1351    040  036.7   22  231.3 ..
T6    500.4    25.3     30.4   357.8  125     057.8   00045       0054A ..
S7    086.20   086.20   090.8  0612   14.12   1351    040  036.7   22  231.3 ..
T7    500.4    25.3     30.4   357.8  125     057.8   00045       0054A ..
```

THIS PRINT IS PROVIDED AS EXAMPLE



MCDU

ENGINE START REPORT <10>

G9409341 - GAUT0T0 - FM31D7000000003

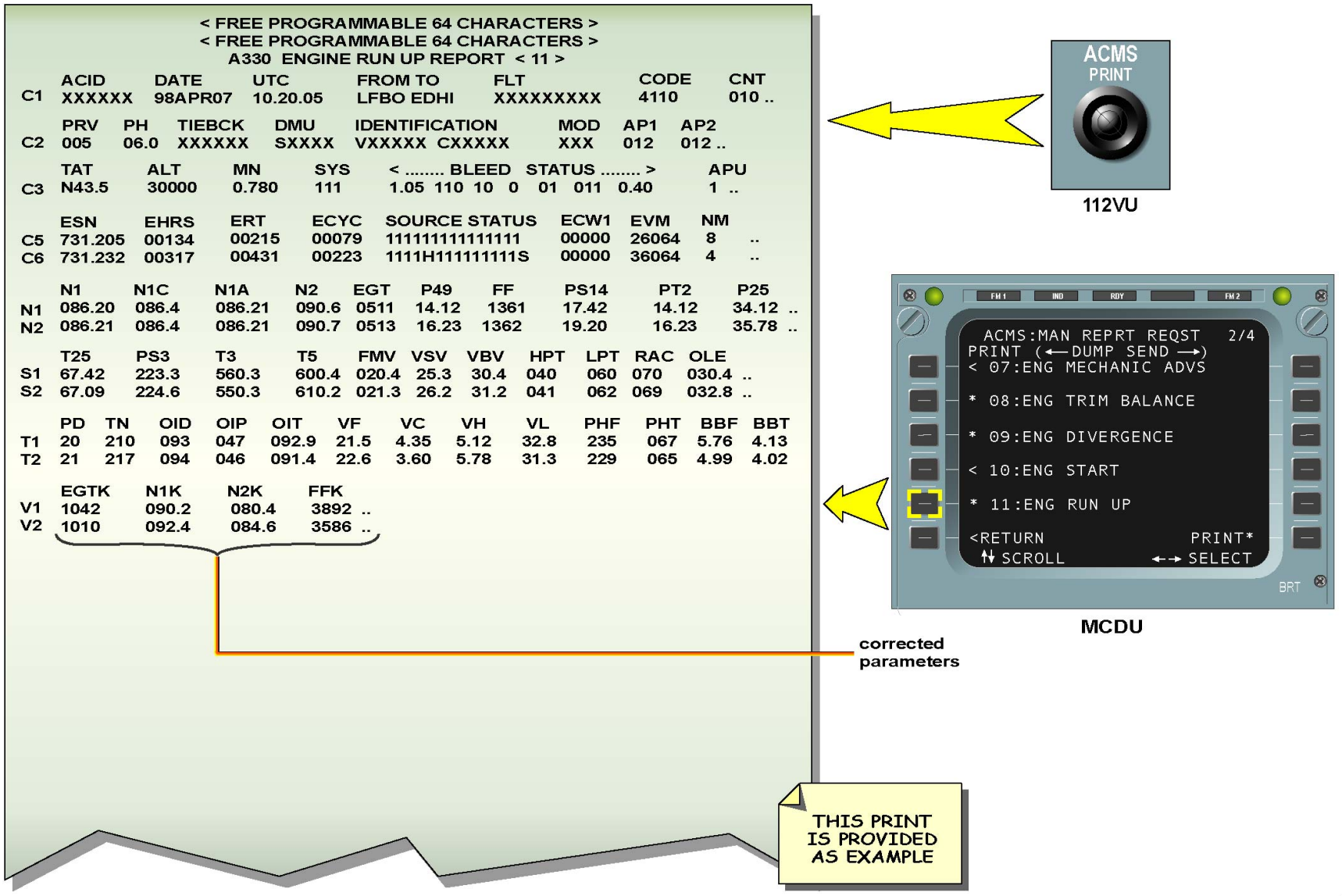
ACMS REPORTS D/O (3)

ENGINE RUN UP REPORT <11>

The Engine Run Up Report is only triggered by manual request through the ACMS PRINT P/B, or the MCDU. It contains the same data as the engine cruise report, plus corrected parameters for the ambient temperature. All data is an average over 20 seconds with the exception of:

- A/C serial number,
- FH with dedicated engine, cycles, control word and vibration status,
- A/C running time with dedicated engine,
- status of FADEC sensors,
- and oil quantity.

G9409341 - GAUT0T0 - FM31D7000000003



ENGINE RUN UP REPORT <11>

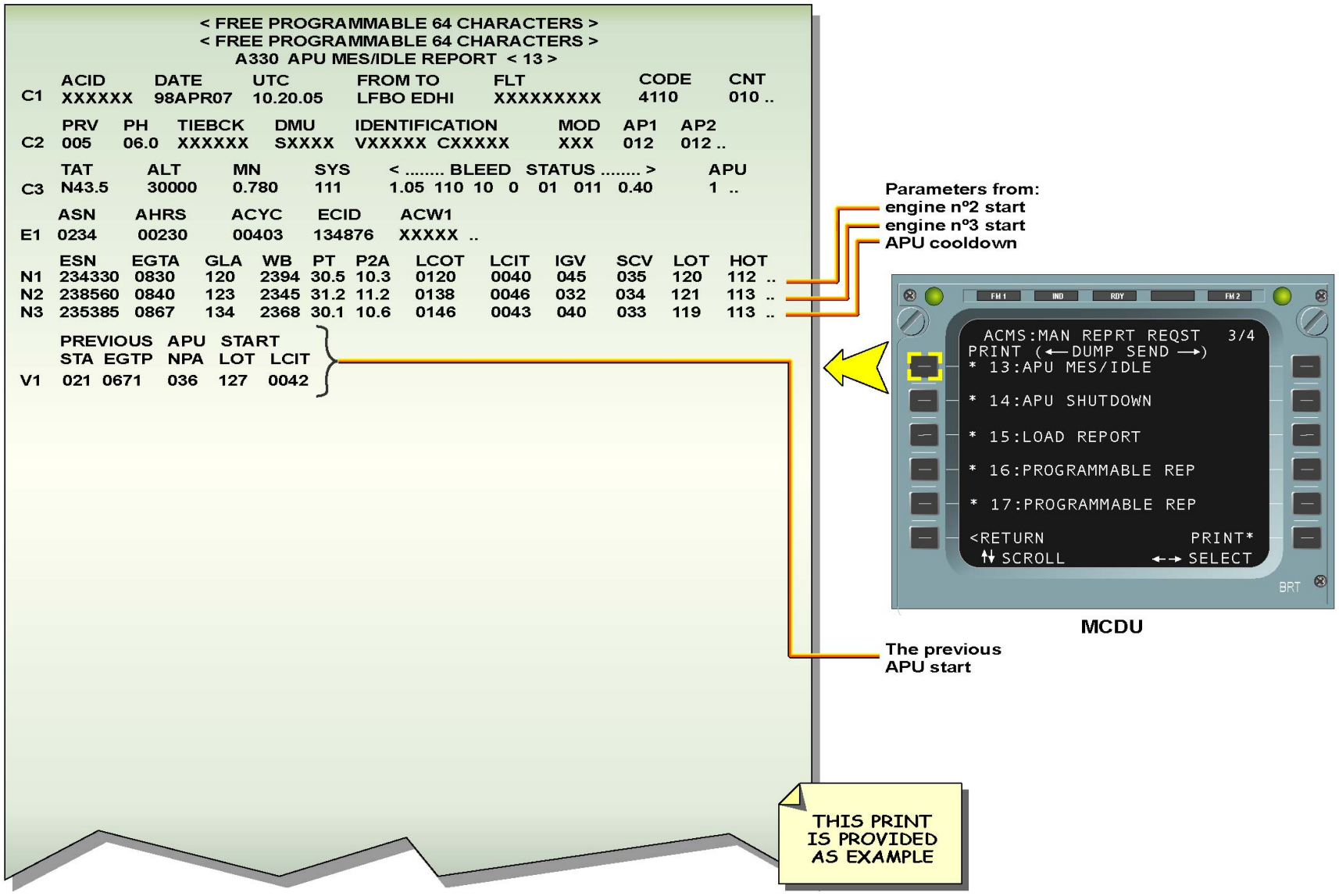
G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

APU MES/IDLE REPORT <13>

The APU MES(Main Engine Start)/IDLE Report is generated when the engine is started with the APU during maximum load. It presents APU parameters during and after engine start and at APU idle. It also presents the previous APU start parameters.

G9409341 - GAUT0T0 - FM31D7000000003


< FREE PROGRAMMABLE 64 CHARACTERS >
< FREE PROGRAMMABLE 64 CHARACTERS >
A330 APU MES/IDLE REPORT < 13 >
ACID DATE UTC FROM TO FLT CODE CNT
C1 XXXXXX 98APR07 10.20.05 LFBO EDHI XXXXXXXXX 4110 010 ..
PRV PH TIEBCK DMU IDENTIFICATION MOD AP1 AP2
C2 005 06.0 XXXXXX SXXXX VXXXXX CXXXXX XXX 012 012 ..
TAT ALT MN SYS < ..... BLEED STATUS ..... > APU
C3 N43.5 30000 0.780 111 1.05 110 10 0 01 011 0.40 1 ..
ASN AHRS ACYC ECID ACW1
E1 0234 00230 00403 134876 XXXXX ..
ESN EGTA GLA WB PT P2A LCOT LCIT IGV SCV LOT HOT
N1 234330 0830 120 2394 30.5 10.3 0120 0040 045 035 120 112 ..
N2 238560 0840 123 2345 31.2 11.2 0138 0046 032 034 121 113 ..
N3 235385 0867 134 2368 30.1 10.6 0146 0043 040 033 119 113 ..
PREVIOUS APU START
STA EGTP NPA LOT LCIT
V1 021 0671 036 127 0042
Parameters from:
engine nº2 start
engine nº3 start
APU cooldown
ACMS:MAN REPRT REQST 3/4
PRINT (← DUMP SEND →)
* 13:APU MES/IDLE
* 14:APU SHUTDOWN
* 15:LOAD REPORT
* 16:PROGRAMMABLE REP
* 17:PROGRAMMABLE REP
<RETURN PRINT*
SCROLL SELECT
MCDU
The previous
APU start
THIS PRINT
IS PROVIDED
AS EXAMPLE

APU MES/IDLE REPORT <13>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

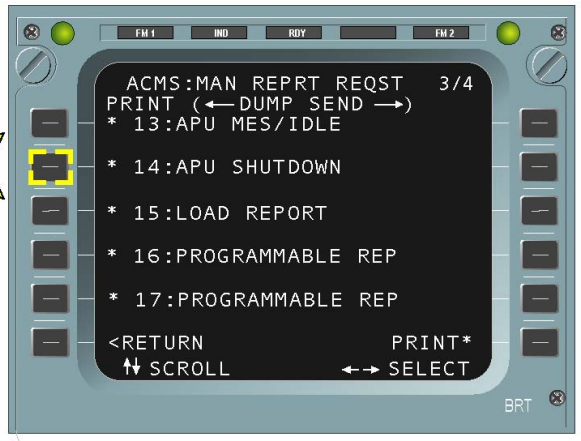
APU SHUTDOWN REPORT <14>

The APU Shutdown Report is generated when an abnormal APU shutdown is detected. Nine data sets are recorded at one second intervals before the event and one data set at the event.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                      A330  APU SHUTDOWN REPORT  < 14 >

     ACID      DATE      UTC       FROM TO      FLT          CODE     CNT
C1   XXXXXX    98APR07   10.20.05  LFBO EDHI    XXXXXXXXX    4110     010 ..

     PRV   PH    TIEBCK   DMU     IDENTIFICATION       MOD   AP1   AP2
C2   005   06.0  XXXXXX   SXXXX   VXXXXX CXXXXX        XXX   012   012 ..

     TAT       ALT       MN        SYS      < ..... BLEED  STATUS ..... >      APU
C3   N43.5     30000     0.780     111        1.05 110 10  0   01  011  0.40     1 ..

     ASN  AHRS  ACYC  ECID    ACW2   ACW3
E1   0234 0023  00409 134076  XXXXX  XXXXX
     REASON: LCN OIL PRESSURE
     PRE EVENT , 1 SECOND INTERVAL

     NA    EGTA   GLA   WB    PT   P2A   LCOT  LCIT  IGV  SCV  LOT  HOT
N1   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
N2   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
N3   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
N4   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
N5   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
N6   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
N7   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
N8   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
N9   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..

                                  AT   EVENT
N0   068   0345   048   0897  37.5 12.4  0069  0032  038  048  110  105 ..
```

THIS PRINT IS PROVIDED AS EXAMPLE



MCDU

APU SHUTDOWN REPORT <14>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

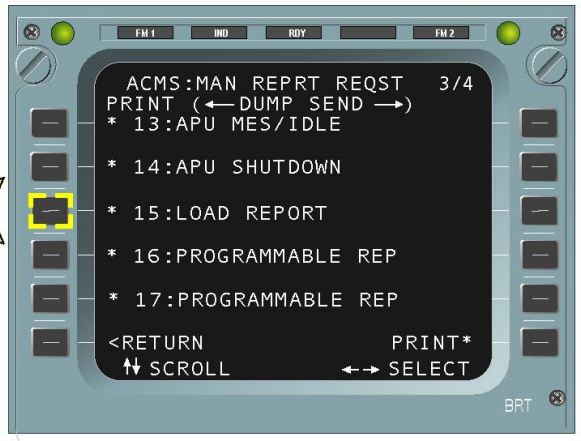
LOAD REPORT <15>

The Load Report is generated when abnormal load conditions have occurred during flight or landing (hard landing detection or A/C bounce). Vertical acceleration is monitored as a function of flaps extended or flaps retracted condition and the report is triggered if the value is out of tolerance. It records, at one second intervals, A/C aerodynamic parameters set before, at and after a hard landing.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                          A330  LOAD REPORT  < 15 >

     ACID      DATE      UTC       FROM TO      FLT          CODE     CNT
C1   XXXXXX    98APR07   10.20.05  LFBO EDHI    XXXXXXXXX    4110     010 ..

     PRV   PH    TIEBCK    DMU      IDENTIFICATION      MOD   AP1   AP2
C2   005   06.0  XXXXXX    SXXXX    VXXXXX CXXXXX       XXX   012   012 ..

     TAT       ALT       MN        SYS      < ..... BLEED  STATUS ..... >     APU
C3   N43.5     30000     0.780     111      1.05 110 10  0  01  011  0.40     1 ..

     VALUES AT MAX EXCEEDANCE
     RALT  CAS  GW      CG    FLAP   SLAT
N1   0124  209  240000  28.3  028.4  023.8 ..
     REASON:  PTCR
          MAX VALUES DURING 1 SEC PRE - AND 1 SEC POST-EVENT
     VRTG    LONG    LATG    ROLL    ROLR    PTCH    PTCR    RALR    LIM1
S0   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   009.372 ..
          MIN VALUES DURING 1 SEC PRE-AND 1 SEC POST-EVENT
S1   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   009.372 ..
                    PRE-EVENT  , 1  SEC INTERVAL
     VRTG    LONG    LATG    ROLL    ROLR    PTCH    PTCR    RALR    RALT
S2   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   0124 ..
               AT AND POST EVENT , 1 SEC INTERVALS
S3   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   0124 ..
S4   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   0124 ..
          MAX VALUES DURING 1 SEC PRE - AND 1 SEC POST-BOUNCE
     VRTG    LONG    LATG    ROLL    ROLR    PTCH    PTCR    RALR    LIM2
S5   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   009.372 ..
          MIN VALUES DURING 1 SEC PRE - AND 1 SEC POST-BOUNCE
S6   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   009.372 ..
                    PRE-BOUNCE  1  SEC INTERVAL
     VRTG    LONG    LATG    ROLL    ROLR    PTCH    PTCR    RALR    RALT
S7   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   0124 ..
               AT AND POST BOUNCE , 1 SEC INTERVALS
S8   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   0124 ..
S9   01.129  03.879  02.210  020.3   032.8   039.4   020.3   006.7   0124 ..
```

PTCR = pitch rate limit exceeded



MCDU

These lines are generated if the A / C bounced

THIS PRINT IS PROVIDED AS EXAMPLE

LOAD REPORT <15>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

USER PROGRAMMABLE REPORT <16>, <17>, <18>

The User Programmable Reports are generated when specific conditions programmed by the airline are met. Each data set contains up to 48 parameters chosen by the airline. The report does not exceed 120 data lines. The sampling intervals, the average intervals and the history times of parameters recording are chosen by the airline. These report programming is done through the GSE.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                A330  PROGRAMMABLE REPORT  < 16 > , < 17 > , < 18 >
     ACID       DATE       UTC          FROM TO       FLT              CODE      CNT
C1   XXXXXX     98APR07    10.20.05     LFBO EDHI     XXXXXXXXX        4110      010 ..

     PRV   PH   TIEBCK     DMU      IDENTIFICATION          MOD   AP1   AP2
C2   005   06.0 XXXXXX    SXXXX    VXXXXX CXXXXX           XXX   012   012 ..

     TAT        ALT        MN       SYS      < ..... BLEED  STATUS ..... >      APU
C3   N43.5      30000      0.780    111      1.05  110  10   0   01   011  0.40   1 ..

     Y1     Y2     Y3     Y4
C4   01.0   00     01     120 ..
      EGT       N2        FF        MN        AOA       LATP      LONP      FQ
C5   116.1     116.1     116.1     006.1     006.1     004.1     004.1     114.1     ..
C6   345.01    344.01    244.01    205.01    221.01    310.00    311.00    074.01    ..
E1   XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXXX   99000X9   990000X9  ..
      EGT       N2        FF        RALT      ZCB
C7   116.2     116.2     116.1     025.1     026.1     ..
C8   345.10    344.10    244.10    164.01    203.11    ..
N1   XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXX    ..
      EGT       N2        FF
1C   116.2     116.2     116.1     ..
2C   345.10    344.10    244.10    ..
T1   XXXXXX    XXXXXX    XXXXXX    ..
      SLAT      FLAP
5C   018.1     0.18.1    ..
6C   124.01    134.01    ..
X1   XXXXXX    XXXXXX    ..
E2   XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXX    ..
N2   XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXX    ..
.
V2   XXXXXX    XXXXXX    XXXXXX    XXXXXX    ..
X2   XXXXXX    XXXXXX    ..
.
.
OE   XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXX    ..
ON   XXXXXX    XXXXXX    XXXXXX    XXXXXX    XXXXXX    ..
.
OV   XXXXXX    XXXXXX    XXXXXX    XXXXXX    ..
OX   XXXXXX    XXXXXX    ..
```

THIS PRINT IS PROVIDED AS EXAMPLE

MCDU

USER PROGRAMMABLE REPORT <16>, <17>, <18>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

ENVIRONMENTAL CONTROL SYSTEM REPORT <19>

The ECS Report is generated when there is a malfunction in the air conditioning or pressurization system. It records engine, A/C and environmental data at and before the event with 15 seconds intervals.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                              A330  ECS REPORT  < 19 >
     ACID      DATE      UTC       FROM TO      FLT          CODE     CNT
C1   XXXXXX    98APR07   10.20.05  LFBO EDHI    XXXXXXXXX    4110     010 ..

     PRV   PH   TIEBCK   DMU     IDENTIFICATION      MOD   AP1   AP2
C2   005   06.0 XXXXXX  SXXXX   VXXXXX CXXXXX       XXX   012   012 ..

     TAT      ALT      MN      SYS     < ..... BLEED  STATUS ..... >     APU
C3   N43.5    30000    0.780   111     1.05 110 10  0  01  011 0.40     1 ..

     ESN      EHRS   ERT   ECYC   SOURCE   STATUS   CZL       NL    TTE
C5   731203   00134  00216 00079  1111H111111111        11111111  999   99 ..
C6   731232   00317  00431 00223  5HH1H1111111111S       ..

     REASON:  EXCESSIVE  CABIN  ALT
                                PRE EVENT
     N1       N2      PS3     T3      TPO     PD      COT   RO   RI   PF    TW
E1   060.29   058.2   223.8   390.3   N039    10.3    100   050  020  0.84  N10 ..
N1   062.40   059.1   224.5   389.2   N020    09.2    090   048  018  0.87  N12 ..
                                                     TP    PTV  FV   ZA    PBV
S1   060.29   058.2   223.8   390.3   N039    10.3    100   050  1    1     0 ..
T1   062.40   059.1   224.5   389.2   N020    09.2    090   048  1    1     1 ..
     ALT      ZCB   PDC   ZLD    VSCB   TAT    SAT    PCW1    PCW2    FOV
V1   30000    11045 03.5  00345  2300   012.4  034.5  XXXXX   XXXXX   060 ..
     V1   V2   V3   V4   V5   V6   V7   ST1    ST2    ST3    ST4    ST5    AOV   CPC
X1   040  038  040  040  038  038  039  19.3   19.3   19.2   19.8   19.4   073    1 ..
                              15 SEC INTERVALS
X2   040  038  040  040  038  038  039  19.3   19.3   19.2   19.8   19.4   073    1 ..
S6   060.29 058.2 223.8 390.3 N039  10.3 100  050  1    1    0 ..
S7   062.40 059.1 224.5 389.2 N020  09.2 090  048  1    1    1 ..
X7   040  038  040  040  038  038  039  19.3   19.3   19.2   19.8   19.4   073    1 ..
.
3X   040  038  040  040  038  038  039  19.3   19.3   19.2   19.8   19.4   073    1 ..
                                AT EVENT
7E   060.29 058.2 223.8 390.3 N039  10.3 100  050  020  0.84  N10 ..
7N   062.40 059.1 224.5 389.2 N020  09.2 090  048  018  0.87  N12 ..
7S   060.29 058.2 223.8 390.3 N039  10.3 100  050  1    1     0 ..
7T   062.40 059.1 224.5 389.2 N020  09.2 090  048  1    1     1 ..
7V   30000  11045 03.5  00345 2300  012.4 034.5 XXXXX XXXXX 060 ..
7X   040  038  040  040  038  038  039  19.3   19.3   19.2   19.8   19.4   073    1 ..
```

MCDU

T - 15 sec

T = event

THIS PRINT IS PROVIDED AS EXAMPLE

ENVIRONMENTAL CONTROL SYSTEM REPORT <19>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

RAM AIR TURBINE TEST REPORT <20>

The Ram Air Turbine Test Report checks the condition of the RAT on ground during test. It records the RAT RPM, the green system pressure, the main landing gear door status and the green electric pump status during one of the three tests and provides their results.
The three tests are:
- Spin up and governing test,
- Pump test,
- Anti stall test.

The RAT Test Report is armed via an MCDU menu.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    A330  RAM AIR TURBINE TEST REPORT  < 20 >

     ACID       DATE       UTC          FROM TO        FLT              CODE      CNT
C1   XXXXXX     98APR07    10.20.05     LFBO EDHI      XXXXXXXXX        4110      010 ..

     PRV    PH    TIEBCK    DMU      IDENTIFICATION          MOD    AP1   AP2
C2   005    06.0  XXXXXX    SXXXX    VXXXXX CXXXXX           XXX    012   012 ..

     TAT        ALT        MN         SYS      < ..... BLEED  STATUS ..... >      APU
C3   N43.5      30000      0.780      111      1.05  110  10   0   01   011  0.40     1 ..

                         PRE EVENT , 1 SEC INTERVAL
     NRAT   HGSP   LGDR   HGEP
N1   3260   1225   1010   1    ..
                       AT AND POST EVENT , 1 SEC INTERVAL

N1   3250  1225  1010  1  ..
N2   3250  1225  1010  1  ..
N3   3250  1225  1010  1  ..
.
.
.
S9   3250  1225  1010  1  ..
0S   3250  1225  1010  1  ..
1S   3250  1225  1010  1  ..

                TEST CONDITIONS OK
                SPIN UP TEST OK
```

MCDU

Result of test

THIS PRINT IS PROVIDED AS EXAMPLE

RAM AIR TURBINE TEST REPORT <20>

G9409341 - GAUT0T0 - FM31D7000000003

ACMS REPORTS D/O (3)

OVERSPEED REPORT <35>

The Overspeed report is generated in case of an overspeed event detected.
The report indicates the various parameters related to the overspeed event.
In line N1 are the values of MAX Calibrated Air Speed (CAS) during overspeed,
In line N2 are the MAX/MIN values of Vertical Acceleration (VRTA) during overspeed,
In lines S1 to S0 are the values from 5sec until 0.5 sec before the event,
In lines 2S to 0S are the values until 5 sec post event.

G9409341 - GAUT0T0 - FM31D7000000003

```
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                    < FREE PROGRAMMABLE 64 CHARACTERS >
                          A330  Overspeed REPORT  < 35 >

     ACID      DATE      UTC       FROM TO      FLT          CODE     CNT
C1   XXXXXX    98APR07   10.20.05  LFBO EDHI    XXXXXXXXX    4110     010 ..

     PRV   PH   TIEBCK   DMU     IDENTIFICATION      MOD   AP1   AP2
C2   005   06.0 XXXXXX  SXXXX   VXXXXX CXXXXX       XXX   012   012 ..

     TAT      ALT      MN       SYS     < ..... BLEED  STATUS ..... >     APU
C3   N43.5    30000    0.780    111     1.05 110 10  0  01  011  0.40     1 ..

     LIMIT EXCEEDANCE SUMMARY

     LIMCAS   LIMMN    TOL  CASMAX  MNMAX  SLAT  FLAP  FA
N1   999      9.999    999  999     9.999  X99.9 X99.9 1

     VRTAMIN  VRTAMAX  DURING  OVERSPEED  DETECTED
N2   X9.999   X9.999

     REASON:  EXCESSIVE  CABIN  ALT

                    PRE  EVENT,  0.5  SEC  INTERVALS

     CAS1  CAS2  CAS3  MN     VRTA   LONA   LATA    SLAT   FLAP   FL  SB
S1   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S2   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S3   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S4   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S5   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S6   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S7   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S8   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S9   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
S0   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9

                    AT  AND  POST  EVENT,  0.5  SEC  INTERVALS

1S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
2S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
3S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
4S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
5S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
6S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
7S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
8S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
9S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
0S   999   999   999   9.999  X9.999 X9.999 X.9.999 X9.999 X99.9  XX  X9
```

From T - 5 sec to T - 0.5 sec

MCDU

T = event

From T to T + 5 sec

THIS PRINT IS PROVIDED AS EXAMPLE

OVERSPEED REPORT <35>

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ACMS SOURCES D/O (3)

GENERAL

The Data Management Unit (DMU) receives about 12000 parameters from the A/C system computers through ARINC 429 buses. Some spare inputs are provided for other computers if necessary. These computers send some parameters, which can be:
- called-up on the MCDU (basically 300 in clear language),
- recorded by the Smart Access Recorder (SAR) /Wireless Digital ACMS Recorder (WDAR) if installed,
- used to create reports.

The DMU can use the parameters directly or after processing (average, mathematical formulas...). The DMU uses specific data from the following system computers to create specific preprogrammed report contents, which are:
- engine condition and A/C performance monitoring reports,
- Auxiliary Power Unit (APU) condition monitoring report,
- load report,
- Environmental Condition System (ECS) report,
- engine run-up report,
- Ram Air Turbine (RAT) test report and programmable report contents.

All the system parameters can be used for the programmable reports, due to this DMU sends the information to the user components. As all the reports have the Standard Header, the DMU uses data from most of the system computers to create this header.

DMU INPUTS

The DMU receives inputs from the following systems.

EIVMU

The Engine Interface and Vibration Monitoring Unit (EIVMU) parameters are used for all the engine and A/C performance reports, one APU Report ("APU MES/IDLE Report"), and the ECS report.

BMC 1, 2

The Bleed air Monitoring Computer (BMC) parameters are used for some engine and A/C performance reports, and the ECS report.

FCMC 1, 2

The Fuel Control and Monitoring Computer (FCMC) parameters are used for only one of the engine reports and A/C performance reports ("Cruise Performance Report").

ADIRU 1, 2

The Air Data/Inertial Reference Unit (ADIRU) parameters are used for the cruise performance report and two A/C performance reports ("Load Report" and "ECS Report").

CPC 1, 2

The Cabin Pressure Controller (CPC) parameters are only used for the ECS report.

FMGEC 1, 2

The Flight Management Guidance and Envelope Computer (FMGEC) parameters are used for only one of the engine reports ("Cruise Performance Report") and one A/C performance report ("Load Report").

ECB

The Electronic Control Box (ECB) parameters are used for the two APU reports ("APU MES/IDLE Report" and "APU Shutdown Report").

FWC 1, 2

The Flight Warning Computer (FWC) parameters are only used for the load report.

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ZC

The Zone Controller (ZC) parameters are only used for the ECS Report.

SDAC 1, 2

Some of the System Data Acquisition Concentrator (SDAC) parameters are used for Engine and A/C performance reports, the two APU reports and the RAT test report. The other parameters are not dedicated to a specific preprogrammed report.

FDIU

The Flight Data Interface Unit (FDIU) part of the Flight Data Interface and Management Unit (FDIMU) sends Digital Flight Data Recorder (DFDR) parameters to the DMU-part of the FDIMU through an ARINC 429 bus so that they can be recorded on the WDAR, if installed.

DMC 1, 2, 3

The Display Management Computer (DMC) parameters are not dedicated to a specific preprogrammed report.

EGPWC

The Enhanced Ground Proximity Warning Computer (EGPWC) parameters are not dedicated to a specific preprogrammed report.

FCU

The Flight Control Unit (FCU) parameters are not dedicated to a specific preprogrammed report.

LGCIU 1, 2

The Landing Gear Control and Interface Unit (LGCIU) parameters are only used for the RAT report.

WBC 1, 2 (OPTION)

The Weight and Balance Computer (WBC) parameters are not dedicated to a specific preprogrammed report.

SFCC 1, 2

The Slat Flap Control Computer (SFCC) parameters are used for only one Engine and A/C performance report ("Cruise Performance Report"), and the load report.

FCDC 1, 2

The Flight Control Data Concentrator (FCDC) parameters are only used for one engine and A/C performance report ("Cruise Performance Report").

OTHER INPUT SOURCES

Some other DMU input sources are the Smoke Detection Control Unit (SDCU), the Multi Mode Receiver (MMR), the Weather Radar (WXR) transceiver, the Integrated Standby Instrument System (ISIS) and the Brake and Steering Control Unit (BSCU).

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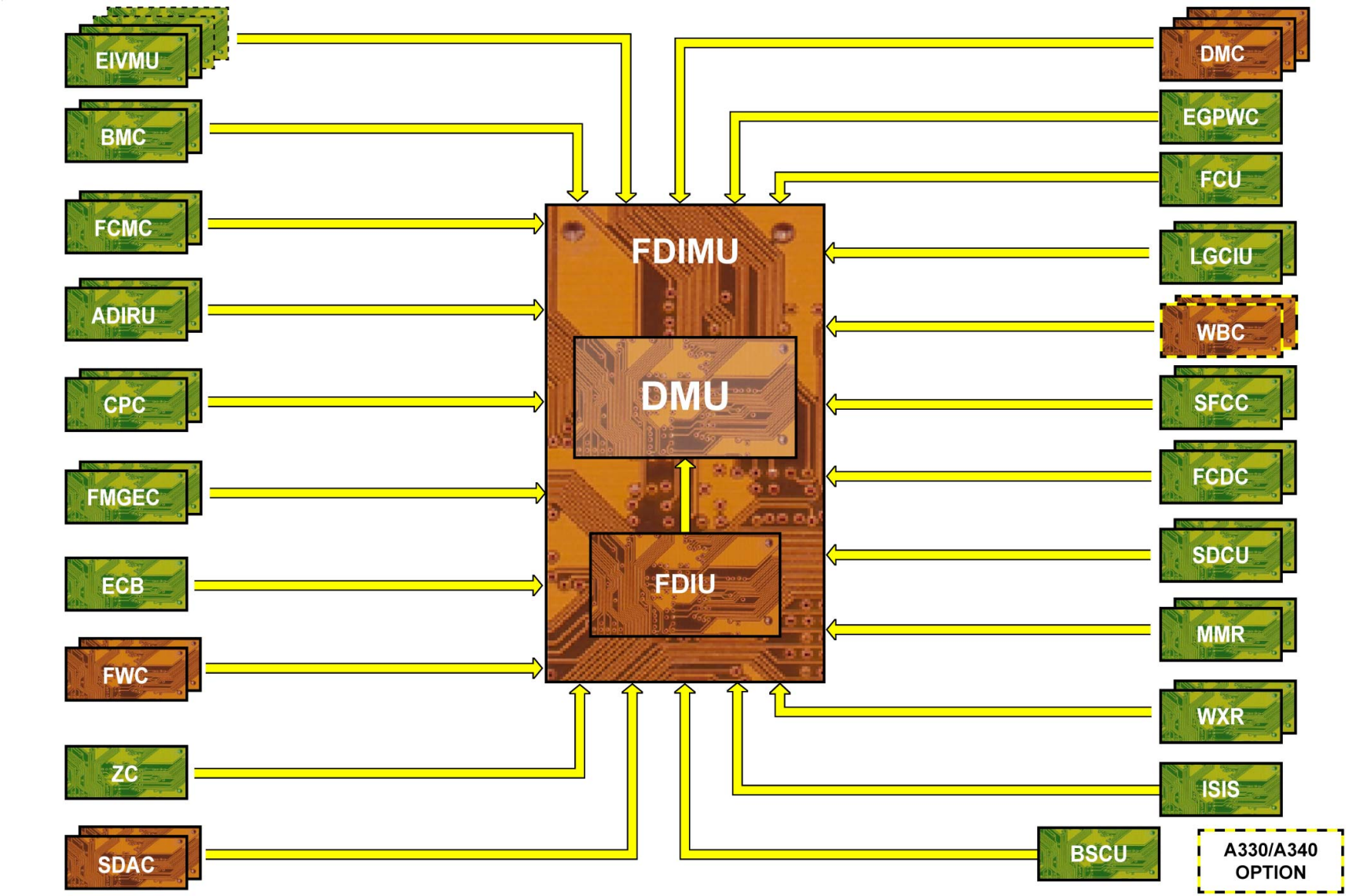

GENERAL & DMU INPUTS

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ACMS SOURCES D/O (3)

DMU INTERFACES

The DMU receives and send data to create programmable reports. The interface is made with the following components.

WDAR (OPTION)

The DMU sends the data for recording to the WDAR in Harvard Bi-phase format on one output bus. It also sends some WDAR controls, on discrete outputs, such as WDAR speed select and WDAR run control. The DMU receives some discrete signals from the WDAR for WDAR status.

MDDU

The DMU can download stored Aircraft Condition Monitoring System (ACMS) reports and SAR content to the Multipurpose Disk Drive Unit (MDDU) on an ARINC 429 bus. DMU system software and setup data base can be uploaded from the MDDU on an ARINC 429 bus. The DMU also receives a signal from the MDDU rotary selector on a discrete signal.

ATSU

The DMU can send ACMS reports to the ground station via the Air Traffic Service Unit (ATSU) on an ARINC 429 bus. The DMU receives ACMS report trigger logic from the ground station via the ATSU on an ARINC 429 bus.

CMC

The DMU sends fault messages to the Central Maintenance Computer (CMC), receives control words and maintenance parameters from this CMC. These two links between the CMC and DMU are ARINC429.

PRINTER

The DMU sends ACMS print reports to the printer on an ARINC 429 bus. The DMU receives printer status information on an ARINC 429 bus.

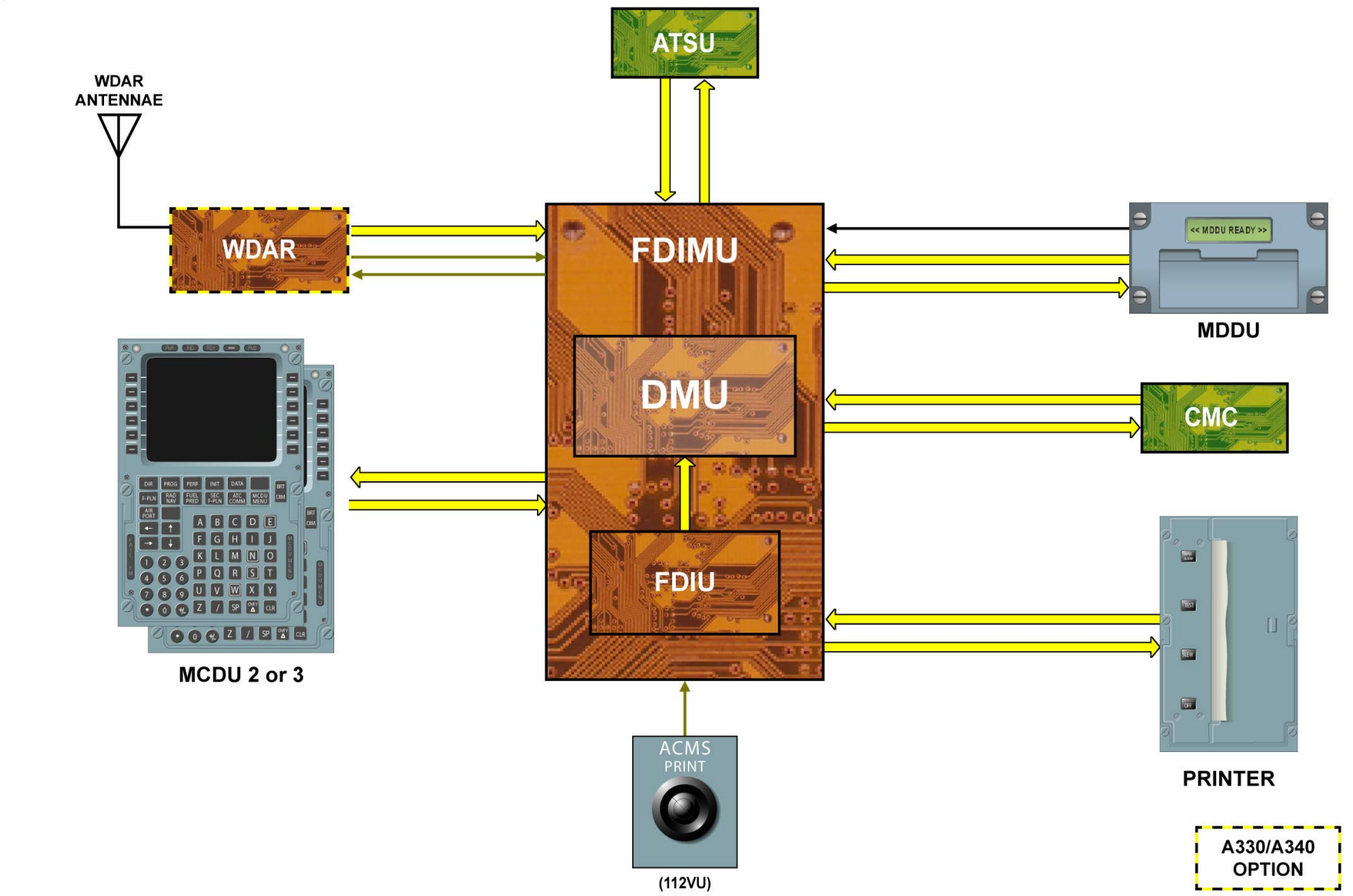
MCDU 2, 3

The user dialogue with the DMU is made through the MCDU 2 or 3 via 2 ARINC buses. The MCDU 2 and 3 enable:
- parameter read-out,
- report controls,
- WDAR (if installed)/SAR controls,
- programming.

REMOTE PRINT

The DMU receives the signal from the ACMS PRINT P/B on one discrete input.

G9409341 - GAUT0T0 - FM31D9000000002



DMU INTERFACES - WDAR (OPTION) ... REMOTE PRINT

G9409341 - GAUT0T0 - FM31D9000000002

RECORDING SYSTEMS BASE MAINTENANCE (3)

AUTO/MAN DUMP PROCEDURE TO DOWNLOAD ACMS DATA FROM THE FDIMU

Note that, to be able to perform the automatic or manual Aircraft Condition Monitoring System (ACMS) reports dump procedure, it is necessary to configure, via the associated Ground Support Equipment (GSE), a 1.44MB formatted 3.5 inch floppy disk in order to dialog with the Flight Data Interface and Management Unit (FDIMU). The configuration file content of each disk defines the type of operation, automatic or manual downloading mode.

AUTOMATIC DUMP PROCEDURE

On the Data Loading Selector (DLS) select the ACMS to enable the downloading operation.
On the side console insert the configured floppy disk into the Multipurpose Disk Drive Unit (MDDU) to activate the communication with the FDIMU, and then, the data transfer.
Monitor data transfer and make a check on completion through the MDDU screen. READY indication is first displayed, then , WAIT RESPONSE, and TRANSF IN PROG . Once the automatic transfer is completed "TRANSF COMPLETE" is shown .
On the Printer, an automatic data dump report prints out with the following indication: ALL FILES SUCCESSFULLY TRANSFERRED.

G9409341 - GAUT0T0 - FM31Y4BASEMCE02

Automatic/Manual Dump Procedure to download ACMS Data from FDIMU

NOTE: For this procedure use prepared 1.44 MB 3.5" disks.
To prepare the disks, see Software Vendor Documentation.

...

Job set-up

...

Procedure

A. Do the Automatic Dump Procedure

On the Overhead Panel Data Loading Selector 101TD:

- Put the Data Loading Selector to ON,
- Push the NEXT key until the indication "ACMS NOT SELECTED",
- Push the SEL CTL key to take over "ACMS SELECTED" indication

On the side console, on the MDDU:

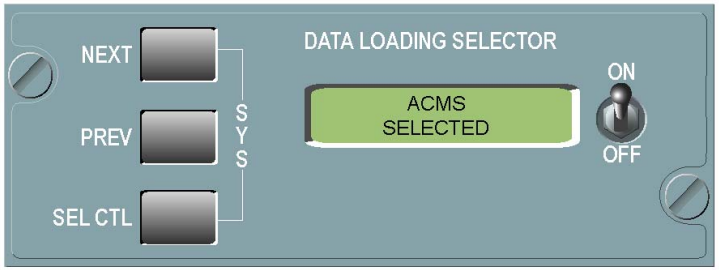
- Open the floppy disk access door,
- Put the prepared disk into the disk drive.

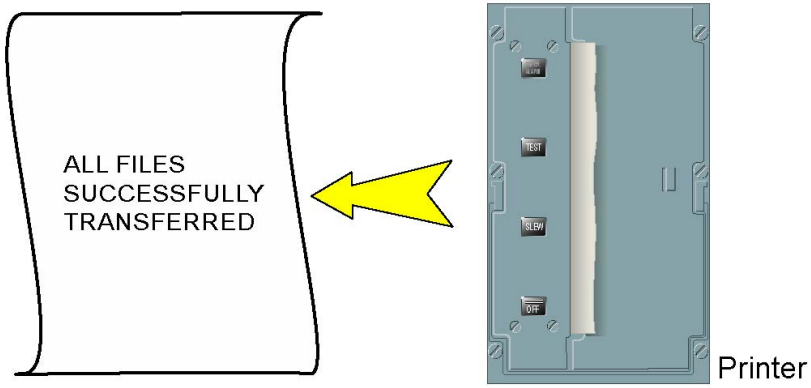
On the center pedestal, on the Printer:

- An automatic data dump report prints out with the text as follows:
  ALL FILES SUCCESSFULLY TRANSFERRED.

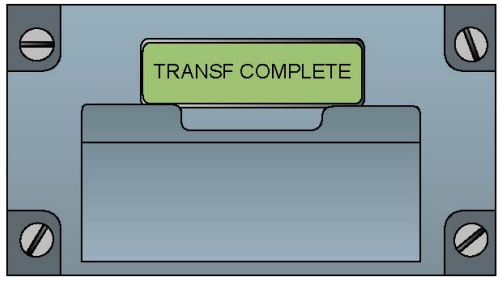
...

...





Printer



Multipurpose Disk Drive Unit (MDDU)

AUTO/MAN DUMP PROCEDURE TO DOWNLOAD ACMS DATA FROM THE FDIMU - AUTOMATIC DUMP PROCEDURE

G9409341 - GAUT0T0 - FM31Y4BASEMCE02

RECORDING SYSTEMS BASE MAINTENANCE (3)

AUTO/MAN DUMP PROCEDURE TO DOWNLOAD ACMS DATA FROM THE FDIMU (continued)

MANUAL DUMP PROCEDURE

On DLS select the ACMS to enable the downloading operation.
From the MCDU ACMS menu, select the STORED REPORTS function to display the type of transferable reports. Then, display DUMP indication on the upper left corner to select the downloading mode.
On the side console insert the configured floppy disk into the MDDU to activate the communication with the FDIMU. On the MDDU the READY indication is first displayed, then, WAIT RESPONSE is shown.
From the STORED REPORTS MCDU page, select the desired report to be transferred. During data transfer, the MDDU displays TRANSF IN PROG, and then TRANSF COMPLETE when the transfer is finished.

G9409341 - GAUT0T0 - FM31Y4BASEMCE02

Automatic/Manual Dump Procedure to download ACMS Data from FDIMU

✓ **NOTE: For this procedure use prepared 1.44 MB 3.5" disks.**
To prepare the disks, see Software Vendor Documentation.

...

✓ **Job set-up**

...

Procedure

✓ **A. Do the Automatic Dump Procedure**

...

B. Do the Manual Dump Procedure

On the Overhead Panel Data Loading Selector 101TD:

✓ - The ACMS SELECTED indication comes into view.

On the MCDU:

✓ - Push the left arrow mode key until DUMP appears on the left.

On the side console, on the MDDU:

✓ - Put the prepared disk into the disk drive.

On the MCDU:

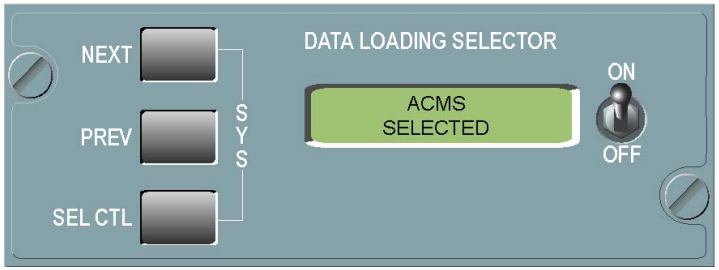
✓ - Push the line key adjacent to the asterisk indication of the related Report Number.

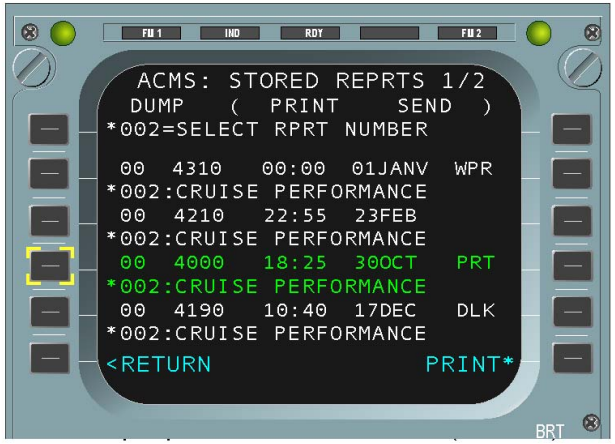
...

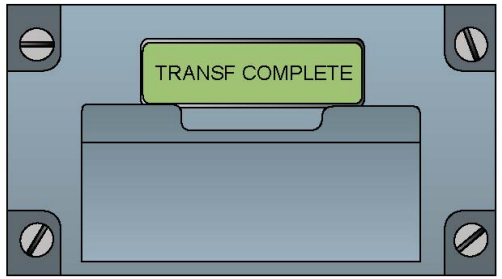
✓ **Close-up**

...

TASK COMPLETED







Multipurpose Disk Drive Unit (MDDU)

AUTO/MAN DUMP PROCEDURE TO DOWNLOAD ACMS DATA FROM THE FDIMU - MANUAL DUMP PROCEDURE

G9409341 - GAUT0T0 - FM31Y4BASEMCE02

RECORDING SYSTEMS BASE MAINTENANCE (3)

OPERATIONAL TEST OF DFDR PLAYBACK VIA MCDU

From the Cockpit Overhead Panel select the RCDR GND CTL button, in order to energize the Digital Flight Data Recorder (DFDR).
From the MCDU Digital Flight Data Recorder System (DFDRS) menu, select the DFDRS INFORMATION function, and make sure that the status of the DFDR is OK, and that the playback signal is well received.
From the ACMS LABEL CALL-UP page, get access to DFDR/LABEL page. Then, select and check the content and the consistency of the DFDR and PLAYBACK data synchronization of the WORD 001.

NOTE: this check ensures that the information transmitted via the Flight Data Interface Unit (FDIU) part to the DFDR is not lost.

From the Cockpit Overhead Panel deselect the RCDR GND CTL button to shut-off the DFDR.

Operational Test of Digital Flight Data Recorder Playback Via MCDU

...

✓ Job set-up

...

Procedure

On the Cockpit Overhead Panel 211VU:
- Push the RCDR GND CTL button.

...

...

OPERATIONAL TEST OF DFDR PLAYBACK VIA MCDU

Operational Test of Digital Flight Data Recorder Playback Via MCDU

...

✓ **Job set-up**

...

Procedure

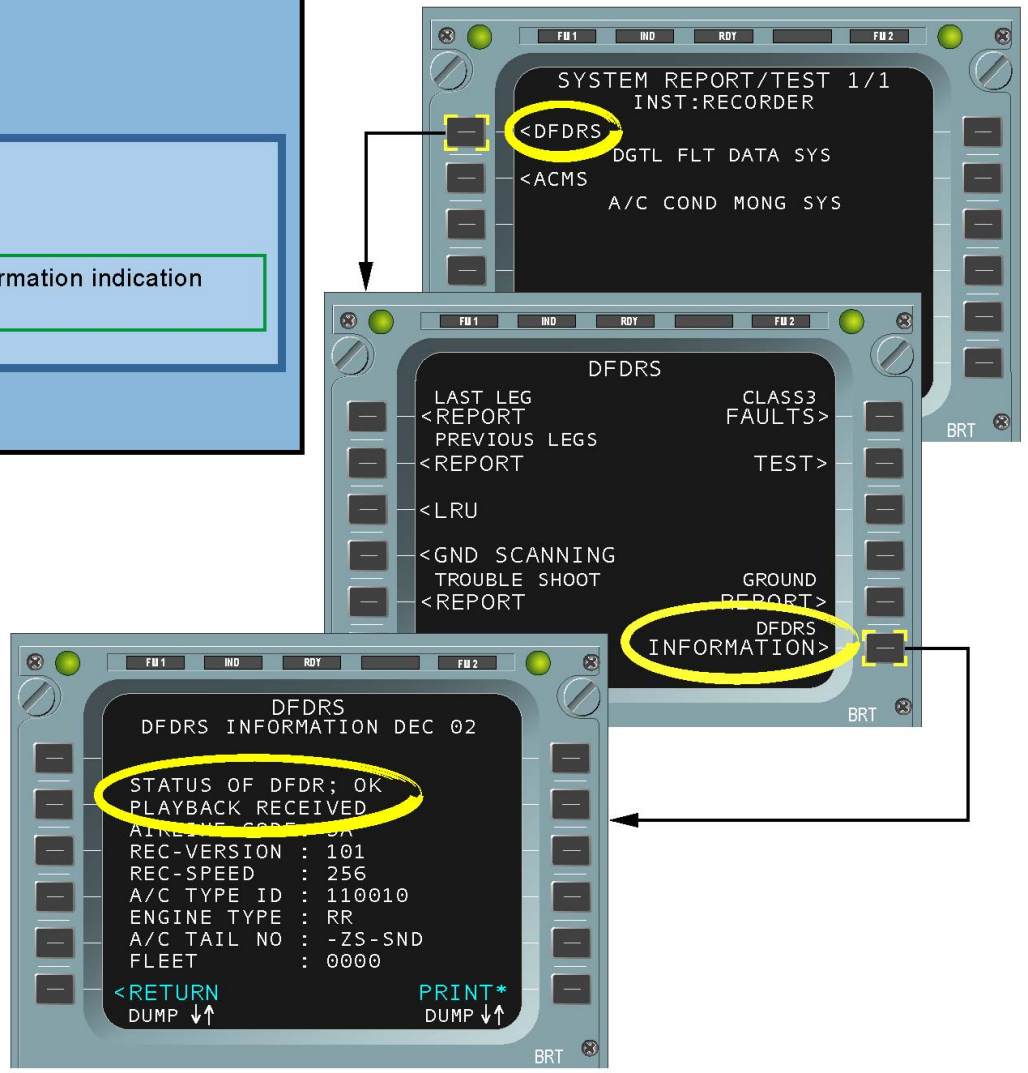
✓ **On the Cockpit Overhead Panel 211VU:**
- Push the RCDR GND CTL button.

On the MCDU:

- Push the line key adjacent to DFDRS Information indication (from the DFDRS page).

...

...



OPERATIONAL TEST OF DFDR PLAYBACK VIA MCDU

G9409341 - GAUT0T0 - FM31Y4BASEMCE02

Operational Test of Digital Flight Data Recorder Playback Via MCDU

...

✓ Job set-up

...

✓ Procedure

✓ On the Cockpit Overhead Panel 211VU:
- Push the RCDR GND CTL button.

On the MCDU:

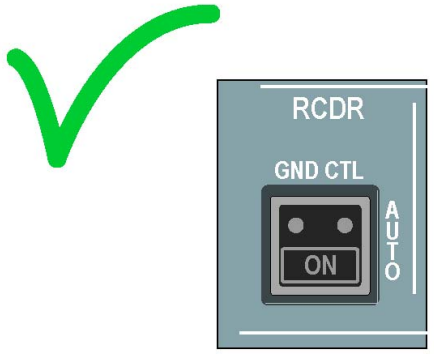
✓
- Push the MCDU MENU mode key,
- Push the line key adjacent to ACMS indication,
- Push the line key adjacent to LABEL indication,

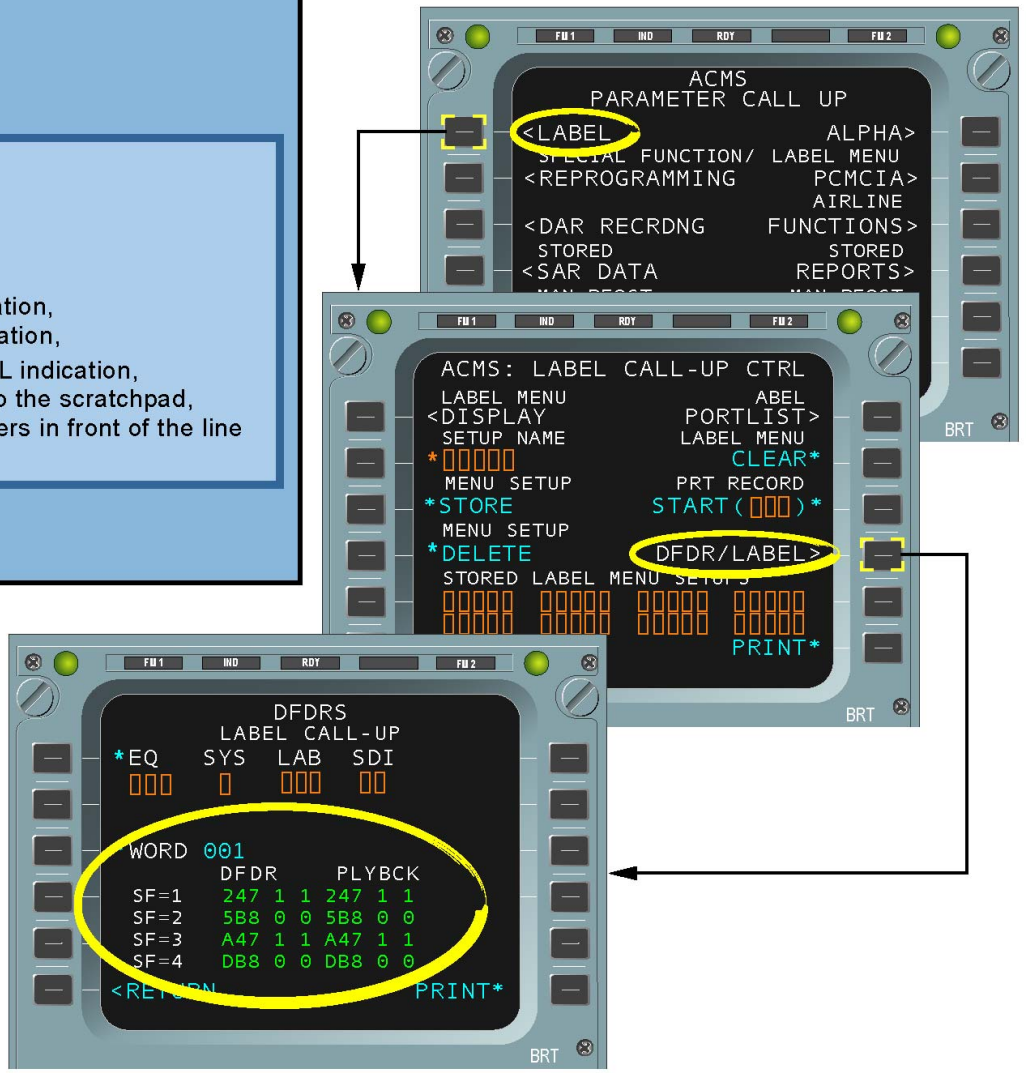
✓
- Push the line key adjacent to DFDR/LABEL indication,
- Enter 001 with the alpha-numeric keys into the scratchpad,
- Push the line key 3L to take over parameters in front of the line key 1L.

✓ Close-up

...

TASK COMPLETED





OPERATIONAL TEST OF DFDR PLAYBACK VIA MCDU

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